

CHAPTER 8

PROSTHODONTIC ASSISTANCE

To be an effective prosthodontic assistant, you need to be familiar with the following general information and basic skills. Your duties will include some of the following:

- Assisting the dentist in prosthodontic procedures
- Setting up prosthodontic instrument trays
- Preparing material for prosthodontic procedures
- Making diagnostic impressions and casts
- Trimming dental casts
- Fabricating mouth and bite guards and custom trays
- Performing simple acrylic repairs

A prosthodontist is a dentist with specialized training in replacing missing teeth; however, many general dentists in your clinic will be able to provide prosthodontic care. Your prosthodontic assisting duties are very similar to those in other specialties. The primary differences are the types of treatment the dentist performs, the material you mix or manipulate, the instruments the dentist uses, and the coordination required with the dental laboratory personnel.

Prosthodontic dentistry deals with the substitution or replacement of oral structures. Prosthodontic dentistry can include anything from replacing one missing tooth to constructing a complex—designed device to replace structures of the face such as eyes, ears, or a cleft palate. Prosthodontic treatment is concerned primarily with replacing missing teeth with some type of artificial substitute. Substitutes for natural teeth are called prosthodontic prostheses. Prosthodontic prostheses are either fixed permanently into the patient's mouth or removable.

TYPES OF FIXED PROSTHETICS

A fixed prosthesis is any variety of replacements for a missing tooth or part of a tooth that a dentist cements in place and the patient cannot remove. Restorations, such as inlays, onlays, crowns, and fixed partial dentures fall into this category. A fixed prosthesis may be constructed entirely from a cast metal alloy, acrylic resin, or porcelain. Frequently, a fixed prosthesis is made of a combination of these

materials. For example, a complete crown may have a metal substructure and a porcelain veneer (facing).

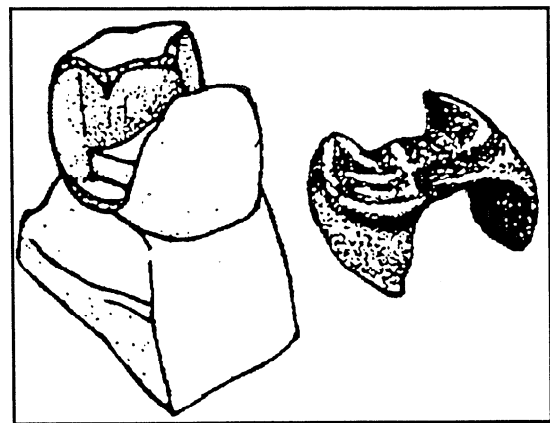
INLAY

An inlay is a dental restoration that fits into a prepared cavity, and is held there by its precision fit and a cementing medium. Inlays are, for the most part, surrounded by intact tooth structures. For this reason, they are often called *intracoronal* restorations. The various forms of inlays are used primarily to restore individual tooth contours and function. In the majority of cases, an inlay is not a suitable anchor casting (retainer) for a fixed partial denture. Inlays are usually cast in medium hard gold, but can be made of other materials (porcelain, resin).

There are five classes of inlays (class I, II, III, IV, and V) based on the location of the surfaces being restored. A more specific way of naming an inlay is to cite the tooth surfaces it restores; for example, MO (mesio-occlusal) inlay, or a MOD (mesio-occlusal-distal) inlay as shown in figure 8-1.

ONLAYS

Onlays are cast gold, resin, or porcelain restorations that ordinarily cover the mesial, occlusal, and distal surfaces (MOD) of posterior teeth. Onlays differ from inlays in that an onlay covers the entire occlusal surface of a tooth to include the cusps. An onlay is the smallest of the fixed prosthetic restorations



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Figure 8-1.—MOD inlay.

classified as an *extracoronaral*. An intracoronaral replacement like an inlay fits into a tooth. An extracoronaral restoration fits around what remains of a tooth.

ARTIFICIAL CROWNS

An artificial crown is a fixed prosthetic restoration that covers more than half of the coronal portions of the tooth. There are several types of crowns. They may be made of gold, porcelain, acrylic, or a combination of these materials. Along with onlays, which are classified as extracoronaral restorations, are the various kinds of crowns that make up the balance of the extracoronaral category.

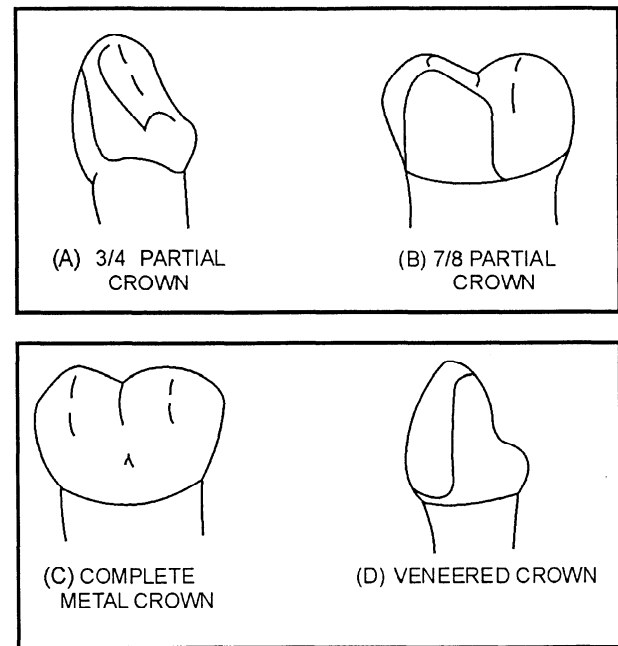
Partial Crown

A partial crown is a cast restoration made entirely from metal and covers more than half but not all of the tooth's clinical crown. A partial crown is named according to the fractional amount of the clinical crown it covers. Examples are the half, three-quarters (see fig. 8-2(A)), four-fifths, and seven-eighths crowns (see fig. 8-2 (B)). In most instances, the facial surface of the tooth is not disturbed for esthetic reasons.

Complete Crown

A complete crown covers the entire anatomy of a tooth's clinical crown. There are several types of complete crowns. A complete metal crown is constructed entirely of a noncorrosive metal, such as gold (see fig. 8-2(C)). A complete veneered crown consists of complete coronal coverage of the tooth with a metal substructure overlaid with porcelain or resin for esthetic effect (see fig. 8-2(D)). A complete crown constructed of cast metal with a fused porcelain (ceramic) veneer is commonly called a PFM (porcelain-fused-to-metal) crown.

A post crown is a complete crown of any kind (complete metal, veneer), supported by a metal extension (post) into a tooth's root canal. Because the pulp is removed from teeth that are endodontically treated, the teeth eventually become brittle and are prone to fracture. In many instances, the teeth are also destroyed by caries or previous restorations and very little clinical crown is left. Often, only the root portion is left to retain the crown. To maintain an endodontically treated tooth as an abutment (anchor) capable of supporting and retaining a crown, it is common practice to cement a post about two-thirds of the way into a root canal. To do this, a gold casting



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Figure 8-2.—Types of artificial crowns.

called a post and core, must be constructed. The part of the post that protrudes from the root canal is called the core. The core, combined with the remains of the coronal part of the tooth, is built to resemble a complete crown preparation. After the post and core are cemented into the root, a complete crown is fabricated on top of this foundation (fig. 8-3). Post and core castings are most often associated with endodontically treated anterior teeth, but they may also be used on posterior teeth as well (fig. 8-4).

FIXED PARTIAL DENTURE

A fixed partial denture (FPD) (fig. 8-5) is a restoration designed to replace more than one missing natural tooth. In contrast to a removable partial denture, the dentist attaches an FPD to natural teeth (abutments) or roots by cementation. An FPD consists of two types of units: retainers and pontics. The unit castings are joined together by connectors. The overall size of the FPD is measured in units. Each pontic or retainer counts as one unit. For example, an FPD with three retainers and two pontics has a total of five units. The units of an FPD may be made entirely from metal, combination of metal or resin, or from a combination of metal and porcelain. Next, we will discuss the retainers, pontics, connectors, and abutments that make up the FPD (fig. 8-5).

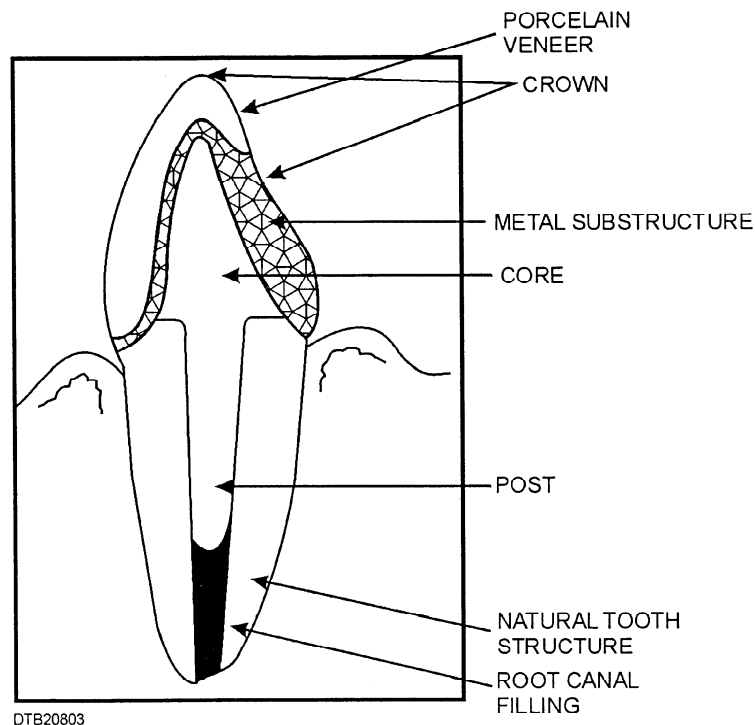


Figure 8-3.—Post and crown.

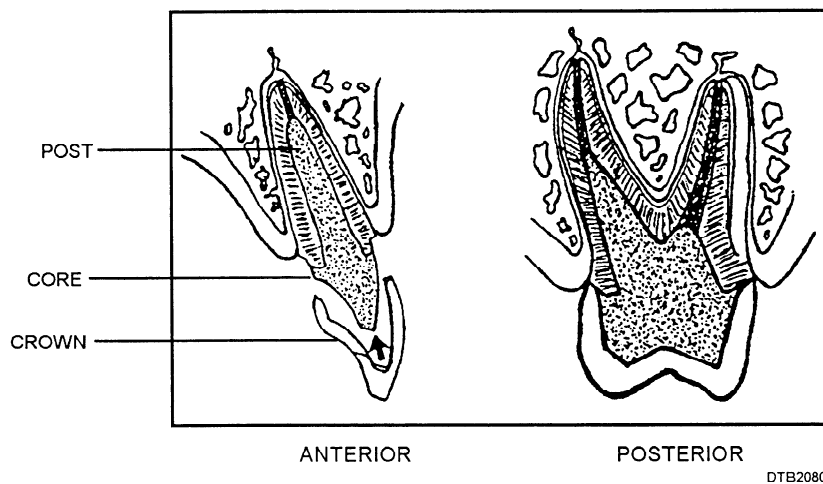


Figure 8-4.—Post and core for anterior and posterior teeth.

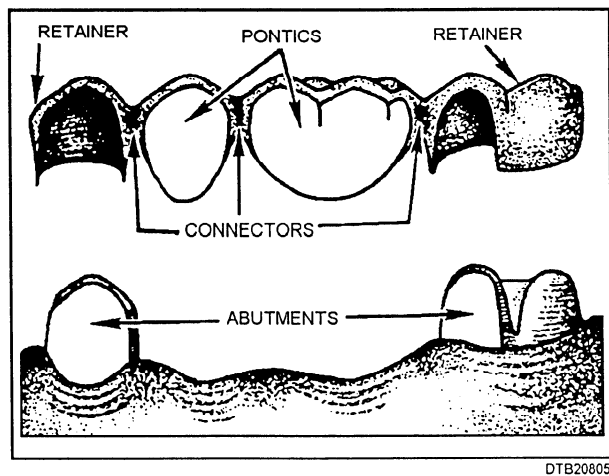


Figure 8-5.—Components of a typical FPD.

Retainers

Part of the FPD will have metal castings, called *retainers*. They are made to fit onto what the dentist has cut away on the abutment teeth. Retainers also secure and support the FPD's artificial tooth or teeth. The most commonly used retainers are PFMs, complete metal crowns, partial crowns, and onlays.

Pontics

A pontic is an artificial tooth that is suspended from the retainer casting. A pontic occupies the space formerly filled by the crown of a natural tooth.

Connectors

A pontic is attached to a retainer by a connector. Connectors can be rigid or nonrigid. Nonrigid connectors take the form of male- and female-locking arrangements. Rigid connectors are classified as either cast or soldered.

Abutments

The teeth that support and hold the retainer are called abutments. It is almost mandatory that an FPD be supported by an abutment at both ends. This requirement is waived in special situations. When a pontic is suspended from only one retainer, it is *cantilevered*.

FIXED SPLINTS

A number of teeth can share a load being placed on one of them. This helps prolong the life of loose teeth or those that have lost supporting bone. Stabilizing a mobile tooth or teeth is called *splinting*. When stabilizing adjacent teeth with connected castings that are cemented in the mouth, the prosthesis becomes a form of *fixed splinting*. Such splints are made in the same fashion as an FPD.

RESIN-BONDED FIXED PARTIAL DENTURES (MARYLAND BRIDGE)

This type of fixed prosthesis is made of a single pontic and thin metal retainers located both proximally and lingually on the abutment teeth. The retainers are specially designed metal-extensions (wings). The FPD is retained by a resin bond between the acid etched abutment teeth and the metal surface of the retainer. A missing left central incisor is illustrated in A of figure 8-6. A fabricated Maryland bridge is illustrated in B of figure 8-6. The bridge in place from the lingual aspect is illustrated in C of figure 8-6. A posterior resin-bonded FPD is shown in figure 8-7.

INTERIM FIXED PARTIAL DENTURE

This is a rigid, **temporary** restoration that replaces missing teeth and is generally made from a self-cutting resin. Its purpose is to protect cut tooth surfaces and hold the abutment teeth in position while the definitive FPD is being fabricated in the dental laboratory.

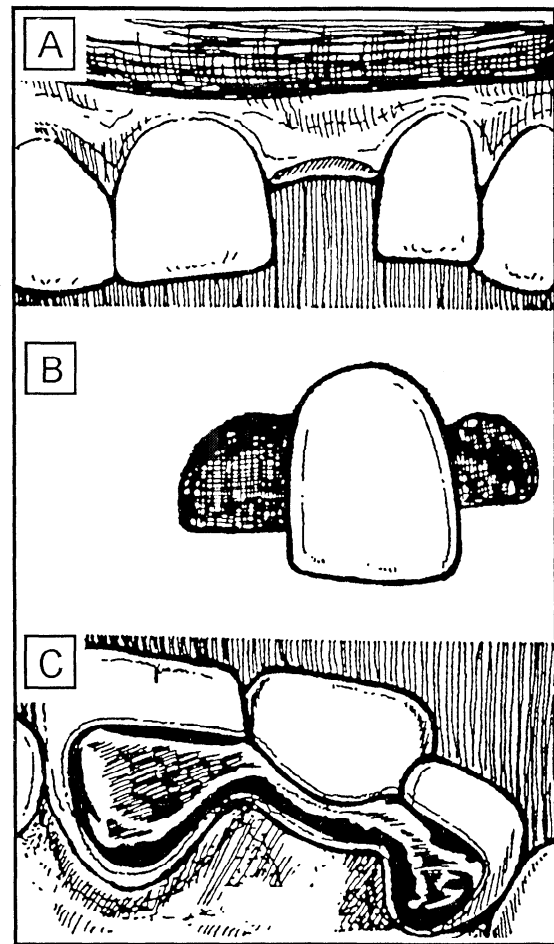


Figure 8-6.—Anterior resin-bonded FPD (Maryland bridge).

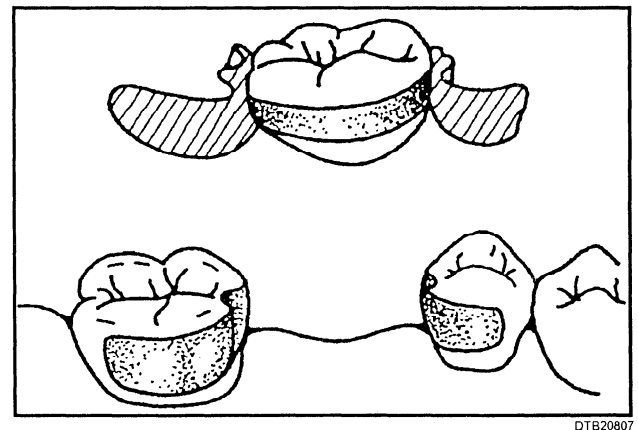


Figure 8-7.—Posterior resin-bonded FPD (Maryland bridge).

TYPES OF REMOVABLE PROSTHETIC PROSTHESES

The three basic types of removable prosthetic prostheses are complete dentures, removable partial dentures, and overdentures. There are variations of each of these types.

COMPLETE DENTURES

A *complete denture* (CD) is a type of removable prosthesis designed to replace all of the natural teeth in an arch and associated structures of the maxilla or mandible (fig. 8-8). However, a CD denture does not usually replace third molars.

The CD consists of an acrylic base and porcelain or acrylic artificial teeth. The base is designed to fit over the alveolar ridge, and is composed of the saddle and gingival area. Sometimes, patients need a set of CDs; one for each arch. If a CD is constructed for insertion immediately following the surgical removal of all remaining teeth, it is considered an *immediate complete denture*. Before a conventional prosthesis is fabricated, the extraction sites must be completely healed. Therefore, immediate dentures are often considered temporary or interim prostheses. The immediate denture also functions as a psychological aid to the patient, who will never have to be completely without teeth. Immediate dentures usually require relines 3 to 12 months after initial insertion. This is because of the dramatic reduction in the ridge size during the healing process.

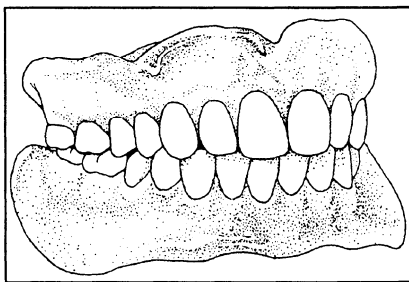


Figure 8-8.—Maxillary and mandibular complete dentures (CDs).

REMOVABLE PARTIAL DENTURES

A *removable partial denture* (RPD) is a type of removable prosthesis designed to replace one or more missing natural teeth (but not all), gingival tissue, and associated parts of the maxilla or mandible. Figure 8-9 illustrates maxillary and mandibular RPDs.

There are several RPD types, based on the materials used to construct the prosthesis. One type is a **cast metal** RPD. This prosthesis may have a cast metal framework with denture plastic and artificial teeth made of resin, ceramic, or metal attached. A cast metal RPD may also be constructed of all metal in which the entire RPD (frame, denture base, and teeth) are all made from cast metal. The dental laboratory will use a nickel chrome-alloy (ticonium metal) for RPD framework castings.

Another type of RPD is the **resin** RPD made completely of acrylic resin. Sometimes, wrought wire clasps are added to the plastic body of a resin RPD to help retain it in the mouth. The resin RPD is often considered an interim RPD and is intended to be temporary in nature. Resin RPDs are used to replace a metal RPD that is broken, no longer fits, or may be prescribed to patients who lose any anterior teeth from an accident. Resin RPDs are a less expensive, and a temporary substitute for replacing missing natural teeth.

If a partial denture is constructed for insertion immediately following the surgical removal of natural teeth, it is called an *immediate partial denture*. These prostheses are often considered temporary or interim prostheses because they are used for a period of time in between events. Once the extraction sites are

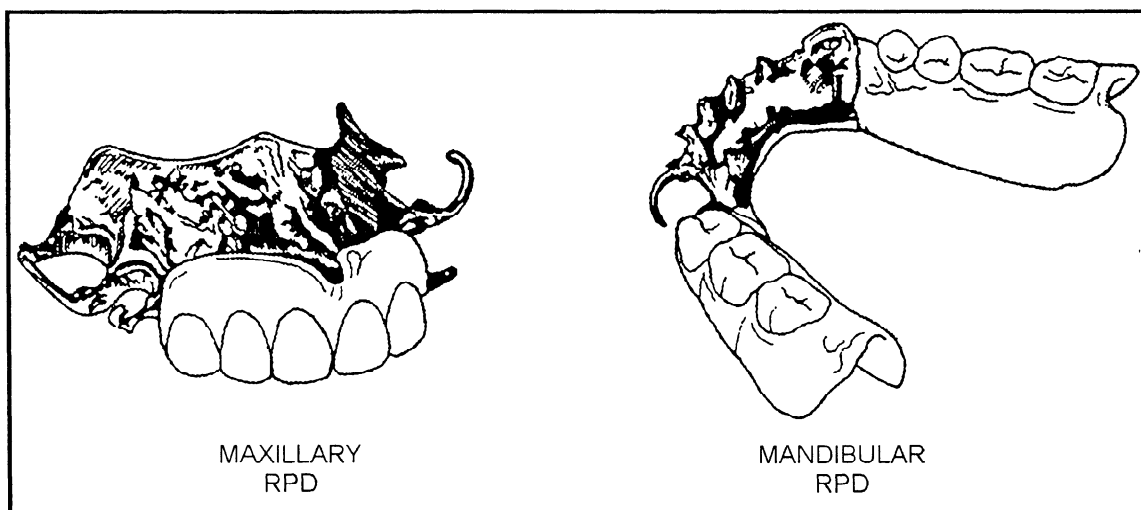


Figure 8-9.—Maxillary and mandibular RPDs.

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well-healed, a conventional RPD is constructed. In-mediate partial dentures are usually fabricated completely of a resin base and denture teeth.

OVERDENTURES

These prostheses include complete, partial, and immediate overdentures. A **complete** overdenture replaces the **entire** dentition and is constructed for insertion over one or more remaining prepared teeth, roots, or dental implants. A **partial** overdenture replaces the **partially missing** dentition and is constructed for insertion over one or more remaining prepared teeth or roots. If the overdenture is constructed for insertion immediately following the surgical removal of natural teeth, leaving no strategic teeth to support the denture, the prosthesis is considered an **immediate** prosthesis.

PROSTHODONTIC MATERIALS

Many dental materials are unique to prosthodontic procedures. The improper use of any of these materials could cause a delay in the treatment and an inconvenience to the patient. You should be familiar with the use, handling, reaction time, and storing procedures for these materials. This knowledge is necessary for your successful performance as a prosthodontic assistant.

DENTAL ALLOYS

Although you do not make dental prostheses as a basic dental assistant, you must know enough about the materials used in their construction to document properly the treatment patients receive. When a patient's prosthesis is given to a dental lab for repair or change, they need to know its history to do the work properly, or a tragic result may follow. You should document all laboratory requests and patient dental records with information, such as alloy type used, solder type, and tooth shade if applicable.

Dental alloys can be classified as precious, semiprecious, and nonprecious. For the purpose of training and clarification, we will classify them as **noble metal** or **base metal** alloys.

Noble Metal Alloys

Noble metals resist oxidation and corrosion. The four noble metals used primarily in dentistry are silver, platinum, palladium, and gold. Gold is very useful for dental put-poses. Although too soft for use alone, it can

be combined with other metals in varying proportions to produce alloys of almost any desired properties. Other noble metals are used in most dental labs to fabricate crowns and FPDs because of the high cost of gold.

Base Metal Alloys

Since base metal alloys do not contain noble metals, they are much stiffer and harder. Thus, they are useful for constructing RPDs and certain types of FPDs.

IMPRESSION MATERIALS

Many types of impression materials are used in the dental clinic. However, no one material fulfills all requirements for making a perfect negative reproduction of the oral structures. The dentist will determine which material will best meet the requirements for each case. The two commonly used impression materials are alginate hydrocolloids and synthetic rubbers.

Alginate Hydrocolloids

Hydrocolloids that change state because of thermal changes are known as *reversible* hydrocolloids because the process can be changed back and forth by altering the temperature. Those that are altered through a chemical change are known as *irreversible* hydrocolloids. Once the chemical change has taken place, it cannot be reversed or turned back to the previous state.

Irreversible hydrocolloids, more commonly known as **alginates**, were developed from seaweed during World War II. Alginate impression material has largely replaced the reversible type for impressions. The advantages of alginate material are that it is easy to prepare and handle, it does not require excess equipment and advanced preparation, it is comfortable for the patient, and it is inexpensive. Alginate is used in making preliminary impressions for all study casts and most final impressions for RPD working casts.

According to the American Dental Association (ADA) specifications, alginate materials are divided into two types based on gelling time:

- Type I—Fast set material, must gel in 1 to 2 minutes.
- Type II—Regular set material, must gel in 2 to 4.5 minutes after the beginning of the mix.

Also, under ADA specification, the manufacturer is required to include detailed instructions for use. The dental assistant should read and follow these directions carefully.

Synthetic Rubber Materials

Rubber impression materials are supplied as pastes in collapsible metal tubes that require mixing. One tube contains the **base**, while the other contains an **accelerator** or a **catalyst**. When mixed in appropriate amounts, the mixture hardens to a synthetic rubber. Other types of materials come in the form of double-barreled injector cartridges that do not require mixing.

CONSISTENCY TYPES.—Rubber impression materials can be used for almost any impression. They come in three consistencies and are discussed in the paragraphs that follow.

Light Bodied.—Light bodied impression materials are injected with a syringe onto preparations for inlays, crowns, and FPDs. It is also used as a "wash" impression for full dentures, relinings, and RPDs. Its high degree of flow registers the fine detail.

Regular Bodied.—Regular bodied impression materials are used in an impression tray for inlays, crowns, and FPDs.

Heavy Bodied.—Heavy bodied impression materials are used in a tray to force light bodied impression material onto the cavity preparation or with a copper band for impressions of single teeth.

MATERIAL TYPES.—Rubber impression materials can be grouped into three types depending on their composition: polysulfides, silicones, and polyethers.

Polysulfides.—The polysulfides (rubber base) can be identified by the usually dark color of one of the two pastes and their resulting opaque mix and sulfur smell. If the materials are improperly mixed, the impression will have streaks in it, thereby affecting dimensional stability. Mixing time is between 45 and 60 seconds with a 5-minute working time. The impression must not begin setting before placement in the mouth. If the 5-minute working time is exceeded, the resulting impression will have inadequate expansion, producing a smaller cast. The impression must set completely before removal from the mouth and poured no later than 1 hour after removal.

Silicones.—Silicone (vinyl polysiloxanes) materials are generally lighter in color, translucent

when set, and have a slight odor. Silicone types come in the form of a heavy putty, light, regular, and heavy bodied viscosities. The silicone material is used with a stock tray to make up the bulk of the impression and minimize distortion. Manufacturers have been able to control shrinkage resulting in impressions with greater accuracy when compared to all other rubber products. Impressions made from silicone do not have to be poured immediately. The material will remain accurate for several days so they can be repoured as necessary.

Polyethers.—Polyethers have lighter colors than polysulfides, but are darker than silicones. The working and setting times are much shorter than the other two rubber impression materials. Polyether is just as good to use as polysulfides to control shrinkage. Unlike polysulfide, polyether will absorb water. This type of impression material is very stiff, making it difficult to remove from the mouth and a cast. The dentist must take care when removing the tray with the material from the mouth, because the polyether tears easily in thin areas like the subgingival sulcus. For best results, use this material with a custom tray.

GYPSUM PRODUCTS

Gypsum products are supplied in powder form. When mixed with water in the correct proportions, a paste forms that will eventually harden. This setting process takes place over several minutes, during which time the mixture is soft and pliable, and can be formed into the desired shape. During the setting process, gypsum gives off heat, which is characteristic of all its products. Each material in the gypsum group is carefully compounded to give it the particular combination of physical properties needed for a particular work order. Dental plaster, stone, and die stone are the most frequently used gypsum products.

Dental Plaster

Plasters made for dental use are specially processed to provide high purity and suitable working properties. One of the most important requirements is that the plaster must set within a definite time limit.

Plaster has many uses. It can be used to form casts, construct matrices, and attach mount casts to an articulator. The initial setting time for most dental plaster is from 7 to 13 minutes. The final set is completed within approximately 45 minutes.

Dental Stone

Compared to plaster, dental stone requires less water in mixing and sets more slowly. When it is set, it is harder, denser, and has a higher crushing strength. These differences make stone the choice to use over dental plaster when using it as a master cast for complete dentures and partial denture construction. Stone is more resistant to scratching and damage and can withstand more pressure in acrylic processing. Stone has many uses, including pouring, mounting casts, and flasking dentures for processing. The initial setting time of a typical stone mixture varies from 8 to 15 minutes. The final set occurs within approximately 45 minutes.

Die Stone

Historically, die stone was only used for making the first pour of a working cast for fixed prosthodontics. Improved die stone now is being used for working casts in removable prosthodontics.

DENTAL WAXES

Dental waxes are important in the construction of dental prosthetic appliances. The waxes are supplied in different types, with each designed for specific purposes. Next we describe the waxes with which a chairside prosthetic technician needs to be familiar and be able to use.

Baseplate Wax

Baseplate wax is used to create a spacer over the cast before custom trays can be made. Another use is as a block-out wax for undercuts on casts. It is available in sheet and ribbon form and is pink in color.

Bite Registration Wax

Bite registration wax is a metal-impregnated wax in sheet form. It is used to record the occlusal relationships between a patient's opposing arches and to later transfer this relationship to the cast for articulation. Often without this record, it is impossible for the dentist or the laboratory technician to properly occlude the patient's cast.

Indicator Wax

Indicator wax is usually green in color and is coated with a water soluble adhesive on one side. It is

used for registering occlusal contacts on natural teeth, individual restorations, FPDs, RPDs, and CDs. It is sometimes used by the dentist to evaluate high spots on restorations.

Sticky Wax

Sticky wax is made of beeswax, paraffin, and resin. Its colors are orange and the darker shades of blue, red, and violet. The resin gives the wax its adhesiveness and hardness. An important requirement of sticky wax is that it must break under pressure rather than bend or distort. This property makes it useful for holding the parts of a broken denture together so that it can be repaired.

Utility Wax

Utility wax is a red or colorless wax that comes in rope form. It is extremely pliable and tacky at room temperature, making it usable without heating. Its main use is in beading (curbing) impressions before boxing and pouring. It can also be used on the impressions trays to avoid the flow of impression material to the back of the throat and to avoid injury to the soft tissue.

ACRYLIC RESINS

There are a number of acrylic resins that you will use and need to be familiar with in prosthetic assisting. *Polymerization* is the term used to describe the processing or curing of acrylic resins. Acrylic resins can be classified by its method of curing. Some of the more common acrylic resins include the heat-cured, self-cured, and light-activated types. When handling acrylic resins, you should be sure to read the manufacturer's instructions and safety precautions before using.

Methyl Methacrylate

Methyl methacrylate is the most widely used synthetic resin used in dentistry. The resin is usually supplied in a fine powder (polymer) and liquid (monomer). They are mixed to form a gel or dough and processed into a rigid solid.

Clear Acrylic

Clear heat-cured acrylic resin is used to construct night guards and surgical templates. As a surgical template (band-aid) it is used after extraction of remaining teeth to show the possible interferences between the alveolar bone and the immediate denture.

Crown and Bridge Resin

These tooth-shaded acrylic resins are used in fixed prosthodontics to make temporary and permanent restorations. The self-curing type is used as an interim restoration while the permanent one is being fabricated. This resin is normally used with a vacuum or pressure-formed matrix to sculpt the contours of the interim crown or bridge.

Orthodontic Resin

Self-curing orthodontic resin is used to fabricate nightguards and orthodontic retainers. It is normally supplied in the clear and pink types and can be used with several tinted liquids to produce different shades.

Repair Resins

These resins are used to fabricate interim RPDs and to repair any acrylic prosthesis. They are normally only stocked by the dental clinic in self-curing pink and light-pink fibered shades.

Tray Acrylic

Self-curing tray acrylic is used to make customized impression trays. Tray acrylic is usually light blue or white in color. You can lengthen the working time of this material by submersing the dough in cold water before it is ready to use.

OTHER PROSTHODONTIC MATERIALS

Along with the prosthodontic materials previously explained in the above categories, you need to become familiar with other miscellaneous materials such as alcohols, mouthguard materials, separating media, tray adhesive, and treatment liners.

Alcohols

Isopropyl, methanol, and denatured ethanol are examples of fuels used in an alcohol torch for softening plastic or melting wax. Of the three, denatured ethanol is preferred since it is safer to use and burns cleaner.

Mouthguard Materials

Mouthguards are made from polyvinyl materials. This thermoplastic resin is molded over a cast by means of a vacuum-forming machine. The use of mouth protectors in sports is to reduce injuries to the

oral tissues, head, and neck. Custom fluoride trays also are made out of this material for prescribed home treatment with fluoride gels.

Separating Media

Separating media prevents one material from bonding to another material. The medium coats the cast and seals off the pores so acrylic resins can now be fabricated on a dental cast and removed.

One type of separating media is tinfoil substitute that when used, forms a film on the cast. To use, paint it on the cast with a soft bristle brush. The film is fragile and can easily be scuffed off. If this occurs, remove the entire film and repaint. Place the acrylic resin to the cast within 1 hour of painting the film on the cast to avoid deterioration. Do not allow gypsum particles to contaminate the bottle of tinfoil substitute when applying to a cast. Many other commercially prepared separators are available to prevent bonding.

Tray Adhesive

Custom impression trays are coated with this adhesive before they are filled with rubber impression material. This ensures that the impression material stays in the tray when it is removed from the mouth. Tray adhesive in spray form is also available for use with alginate impression materials and stock impression trays.

Treatment Liners

Treatment liners, also known as tissue conditioners, allow oral tissues to recover, improving tone and health, before making a new denture or relining an existing one. The dentist changes the tissue conditioner at 3- to 4-day intervals since liners stiffen rapidly.

BASIC PROSTHODONTIC EQUIPMENT

The prosthodontic equipment that you will use will be located in the dental laboratory and the prosthodontic DTR. Only the basic equipment is mentioned. Never operate or use any type of equipment without first reading the manufacturer's instructions on use, safety precautions, and maintenance.

ALCOHOL TORCH

The alcohol torch (fig. 8-10) is used for smoothing wax surfaces, setting teeth, and waxing. It is also used with a variety of tasks that require an accurate, controlled pointed flame. It draws fuel through a wick from a reservoir near the top of the torch. Periodically trim all irregular or burned areas of the wick and check the nozzle tip to ensure that it is free from obstructions.

CAUTION

Never overfill the fuel reservoir or attempt to fill it with the flame lit.

Before using an alcohol torch, you should check the fuel level. Many different types of fuels can be used with an alcohol torch. Isopropyl alcohol in a solution containing about 70-percent alcohol and 30-percent distilled water by volume produces a flame of very poor quality. Further, 100 percent isopropyl alcohol tends to smoke badly while burning, which makes it somewhat undesirable as torch fuel. The best choice fuel for the alcohol torch is denatured alcohol (ethanol), which produces a clear blue flame. However, care with the accountability of denatured alcohol must be taken when used and distributed. Rubbing alcohol is unsuitable as a fuel.

Note: Methyl alcohol is highly poisonous if taken internally.

Do not leave the torch unattended when lit. Extinguish the torch when not in use by covering the wick with the nozzle holder assembly.



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Figure 8-10.—Alcohol torch.

ARTICULATOR

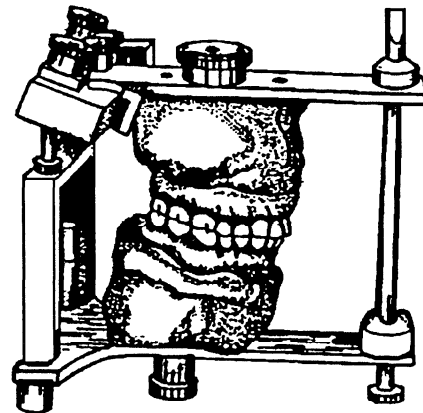
The articulator (fig. 8-11) is used to reproduce the patient's jaw movements. The dental cast made from impressions are mounted onto the articulator. This allows the dentist and the laboratory technician to recreate the normal movement of the patient's jaw during the fabrication of the prosthesis. There are several types of articulators. The type of articulator used depends upon the type of prosthesis being fabricated.

BENCH LATHE

The bench lathe (fig. 8-12) is used during grinding, finishing, and polishing procedures. Always wear protective glasses or goggles when working with the bench lathe. Ensure that all chucks and attachments are securely mounted before starting the lathe.

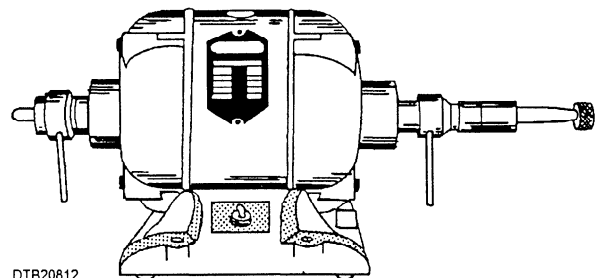
WARNING

Never leave an unattended lathe running, or attempt to stop the lathe by grasping the attachment with your hands.



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Figure 8-11.—Articulator.



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Figure 8-12.—Bench lathe.

The lathe is used with rotary instruments (burs, stones, arbor bands, and ragwheels, etc.). An adapter and/or chuck is required to attach these instruments to the lathe.

BUNSEN BURNER

The Bunsen burner (fig. 8-13) heats wax-carving instruments, waxes, and modeling compound. It requires a balanced air and gas mixture to produce a clean blue flame. It is attached to a gas valve with a non-collapsible hose.

Inspect the unit and hose daily for loose connections and defects. Have the hose replaced when it shows signs of wear. When wax or similar material drops into the burner, the burner assembly detaches easily for boiling out and cleaning.

WARNING

Never leave an unattended burner lit or reach over an open flame, because the flame is almost invisible and can cause serious harm.

CAST TRIMMER

The cast trimmer (fig. 8-14) is used to trim and contour casts. A cast should present a neat, attractive appearance. This electrically operated machine has a 10-inch abrasive wheel, a small work table, and a water-dispensing mechanism to keep the abrasive wheel rinsed clean and clog free.

Before using the trimmer, ensure the water supply is on. Allow the water to run for at least 1 minute after

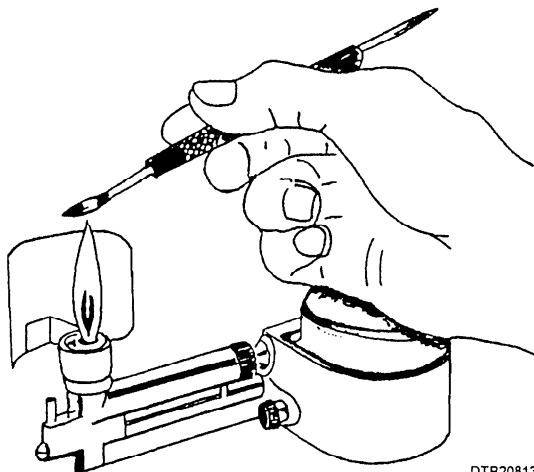


Figure 8-13.—Bunsen burner.

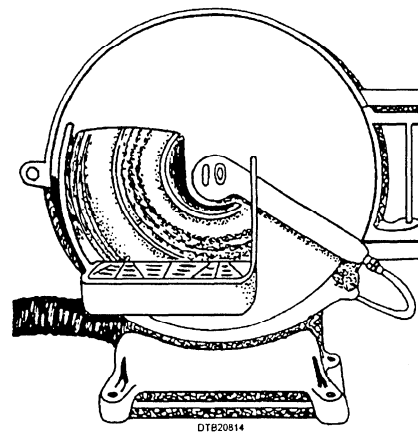


Figure 8-14.—Cast trimmer.

the procedure is complete. This will flush most of the particles from the trimmer drain and help prevent clogging.

WARNING

When operating the trimmer, be sure to keep your fingers away from the wheel. Always wear safety glasses or goggles.

Using light pressure, press the cast against the trimming wheel. Ensure that the water spray is sufficient to contain the grindings.

Check the unit for water leaks and the power cord for wear or damage. If the unit it does not operate correctly, contact the dental equipment repair technician. Clean the trimmer at least quarterly, or more frequently, depending on the amount of usage.

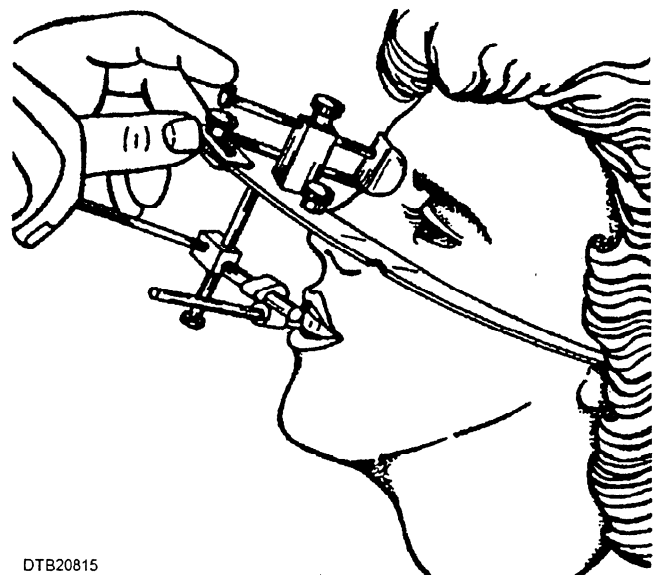


Figure 8-15.—Face-bow.

FACE-BOW

The face-bow is a mechanical device (fig. 8-15) used to duplicate the position of the maxilla to an articulator. The face-bow rests on the patient's face and a wax bite plate is inserted into the oral cavity to record the patient's bite. Several types of face-bows are available for use.

IMPRESSION TRAYS

Impression trays hold the impression material in place while it sets. The impression may include a portion of the arch or the entire arch. Generally, the impression tray is shaped to match the natural contour of the arch. The two basic types of trays are stock and custom trays. With either type, the tray used for the mandibular impression differs from the maxillary tray because it allows free tongue movement.

Stock Trays

Stock trays come in many sizes for both the maxillary and mandibular arches. As figures 8-16 and 8-17 illustrate, stock trays may be rimlocking or mesh. Both stock trays are available in regular, edentulous, and orthodontic styles. Generally, the size of a tray will be identified on the handle tray.

Rimlock trays are easily identified by a rim that resembles a metal wire soldered along the inner part of the tray at the edge of the outer borders. The maxillary impression tray has a U-shaped wire soldered to a palatal area on the tray. Semiliquid impression

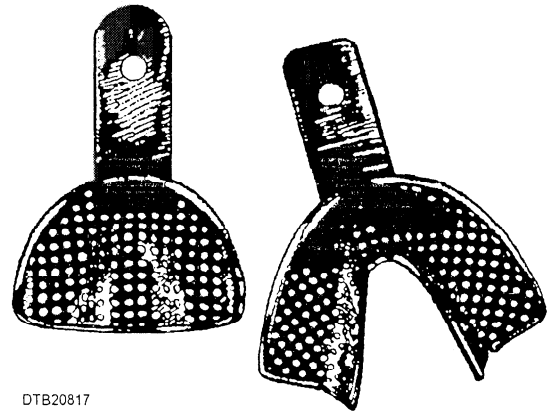


Figure 8-17.—Maxillary and mandibular mesh stock trays.

material flows into the undercuts (ledges) formed by the rim and sets (hardens). This locks the material in the tray.

Use liquid tray adhesive or the spray type on impression trays to ensure that the impression material does not separate from the tray. Stock trays are used for hydrocolloid impression materials. Unless disposable, stock trays must be cleaned and sterilized after each patient use.

Custom Trays

Custom trays are made in the dental laboratory from tray acrylic. Since custom trays are made for individual patients, you must have a dental cast of the patient's teeth. The fabrication of custom trays is discussed later in this chapter.

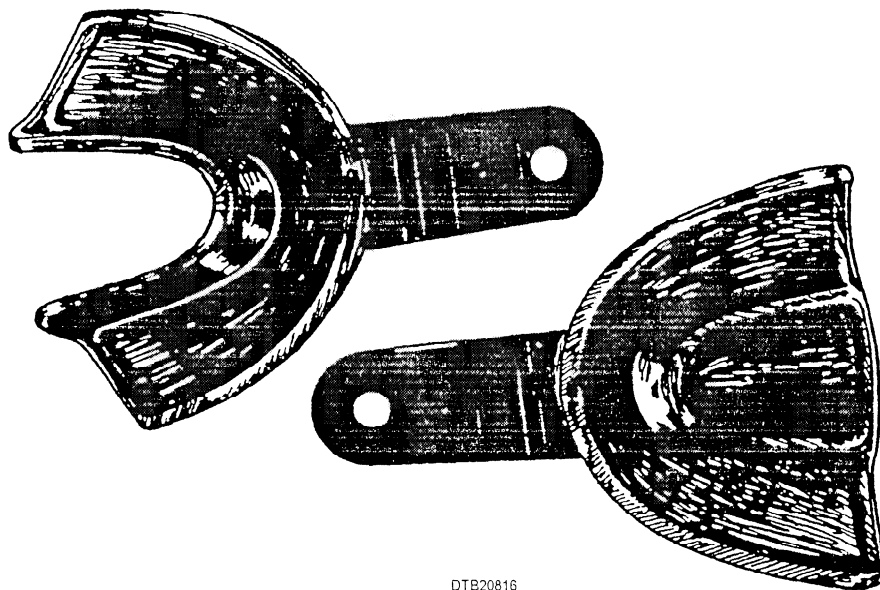


Figure 8-16.—Maxillary and mandibular rimlock stock trays.

MIXING BOWL

The mixing bowl is made of flexible material, either rubber (fig. 8-18) or flexible plastic, and used to mix alginate impression material and dental stone. It comes in small, medium, large, and extra large sizes. All sizes are used in the dental laboratory. A spatula is used to blend the powdered alginate or dental stone and water together. You may also find that a regular table knife may be used as a mixing spatula. In either case, the rounded ends on the spatula or table knife should approximate the contour of the mixing bowl.

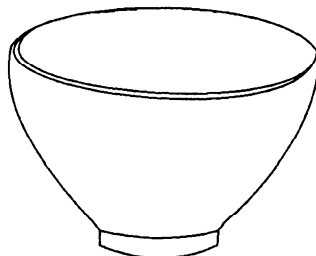
PNEUMATIC CURING UNIT

The pneumatic curing unit (fig. 8-19) is commonly called a pressure pot. It is used during the polymerization of self-curing acrylic resins. It is used to cure relines and repairs of complete and removable partial dentures. The unit has a compressed air inlet that allows air pressure to fill the pot. Curing of the resin under pressure significantly reduces the possibility of pores or voids with the resin. Lukewarm water (115°F) is usually placed in the pot to hasten polymerization. To use, place the appliance that is to be cured in the pot. Ensure the appliance is completely submerged in the water. Secure the pot top. Fill the pot with compressed air. The normal curing time is 30 minutes at 20 psi.

WARNING

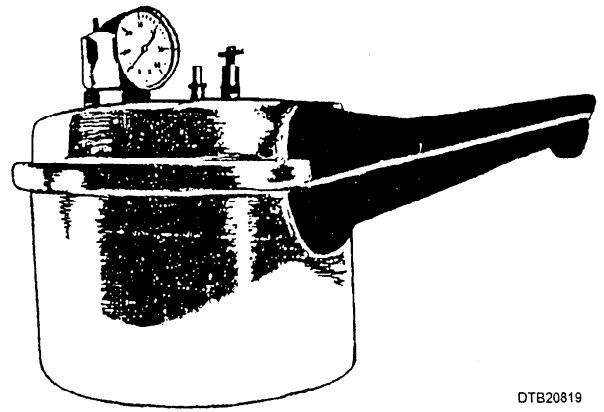
You must never exceed the maximum air pressure indicated in the manufacturer's instructions. Excessive pressure may cause the pot to explode.

Curing time may vary depending on the thickness of the resin being cured. After curing, use the air relief valve to let the air escape. Ensure that no air pressure remains in the pot when retrieving the cured prosthesis from the pot.



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Figure 8-18.—Rubber mixing bowl.



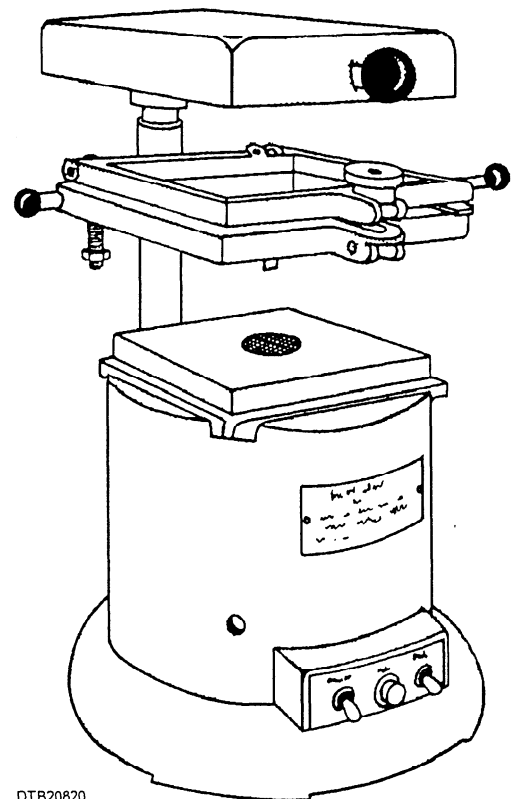
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Figure 8-19.—Pneumatic curing unit.

Periodically check the seals, air inlets, and outlets for malfunction. Activate the pressure relief valve to ensure it is operational. When necessary, lubricate the "O" ring inside the lid with petrolatum.

VACUUM ADAPTER

The vacuum adapter (fig. 8-20) is used for the rapid fabrication of custom trays, stents, mouthguards, and bite guards. This unit is also referred to as the vacuum former. The vacuum former will soften a sheet of plastic or acrylic resin and then draw it onto the cast with suction.



DTB20820

Figure 8-20.—Vacuum adapter.

The heating element is housed inside a metal assembly at the very top portion of the unit. This section will become extremely hot when in use. Use caution. Before use, inspect the vacuum holes in the platform to make sure they are not obstructed. Inspect the rubber sealing gasket for cracks and deterioration. Clean the exterior of the unit and inspect the electrical cord and plug before each use.

VIBRATOR

The vibrator (fig. 8-21) is used to move dental plaster or dental stone mixes when pouring a cast. The vibrator also increases the density of the mix by eliminating air bubbles. A rheostat control is used to adjust the intensity of the vibration from a gentle agitation to a vigorous shaking.

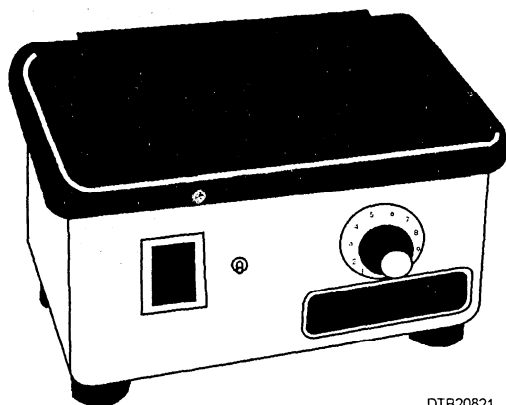
To maintain the vibrator, cover the rubber platform and body of the unit with a plastic cover. As a safety precaution, check the power cord and plug for defects before use.

BASIC PROSTHODONTIC INSTRUMENTS

Some of the common prosthodontic instruments you and the dentist will use during patient treatment and in the fabrication of dental prostheses are explained in the following paragraphs.

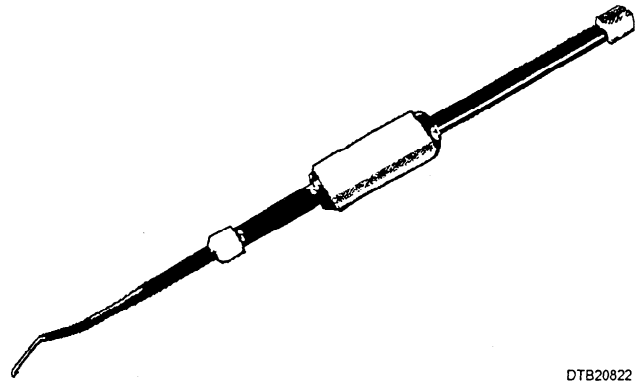
CROWN REMOVER

To remove a crown from a tooth, the dentist uses a crown remover instrument (fig. 8-22). The handle on the crown remover is encircled with a heavy-steel weight that slides from one end of the handle to the other. Two interchangeable points make up the working end. One of these points is contra-angled and the other is straight. Both points have a right-angle



DTB20821

Figure 8-21.—Vibrator.



DTB20822

Figure 8-22.—Crown remover.

projection at the top. When the crown remover is used properly, the tip is placed over the margin or junction of the crown and tooth first. Then the sliding weight on the handle is tapped against the bottom part of the handle.

ROACH CARVER

The roach carver (fig. 8-23) is a double-ended instrument used to cut, smooth, and carve dental waxes. At first glance, it appears to look like a wax spatula. A closer look reveals a spear-shaped blade at one end, with a deep-welled, very small spoon at the other end. Both ends have very sharp edges. The deep-welled end may also be used to carry melted wax.

PROSTHODONTIC KNIVES

Usually, two kinds of knives are used in the prosthodontic treatment room: the compound knife and plaster knife. As the names imply, one is used with compound, and the other with plaster.

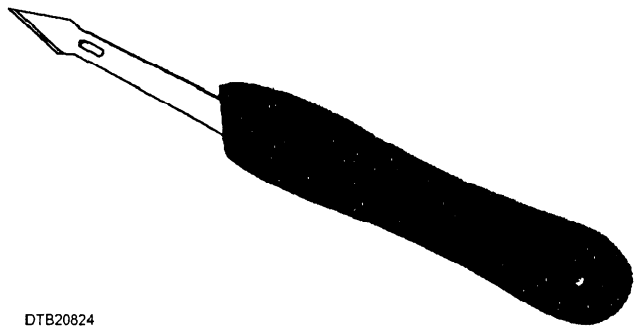
Compound Knife

The compound knife (fig. 8-24) has a fairly large, red plastic handle and detachable blade. Routinely the #25 blade is used to trim impression compound, wax, and other materials that require an extremely sharp cutting edge. The blade is almost identical to a larger version of the #11 surgical blade. Your primary concern with the compound knife is to replace broken or dull blades.



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Figure 8-23.—Roach carver.



DTB20824

Figure 8-24.—Compound knife with #25 blade.

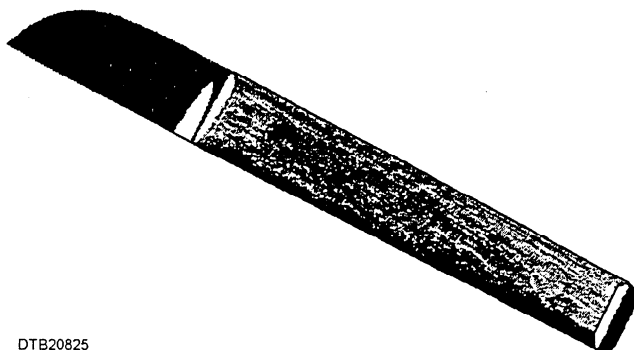
Plaster Knife

The plaster knife (fig. 8-25) is a heavy-duty knife used to trim and chisel gypsum products and impression compound. It has a large flat blade at one end with a wide projection shaped like a screwdriver at the other end. The handle is made of wood and is riveted in place. You must keep its blade sharp.

PROSTHODONTIC SPATULAS

Spatulas are used in prosthodontics for handling dental waxes and mixing impression materials. The laboratory spatula shown in figure 8-26 is used to mix the various impression materials. It has a 2-1/2 inch flexible blade, which is about 1-inch wide with a rounded end. The handle is usually made of wood or plastic.

The wax spatulas commonly used are the #7 (fig. 8-27) and the #31 (fig. 8-28). Both spatulas are used to hold small bits of wax over a Bunsen burner flame that delivers liquid wax.



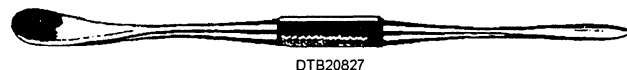
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Figure 8-25.—Plaster knife.



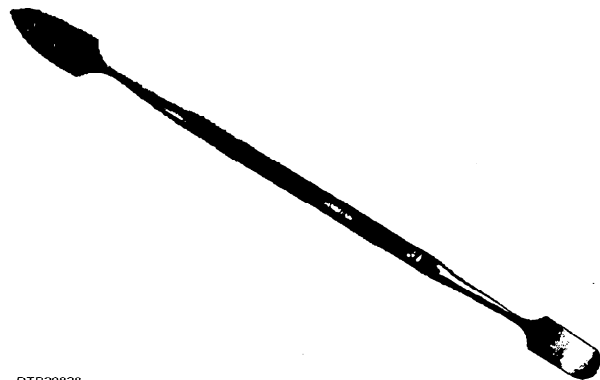
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Figure 8-26.—Laboratory spatula.



DTB20827

Figure 8-27.—Wax spatula, #7.



DTB20828

Figure 8-28.—Wax spatula, #31.

PRELIMINARY IMPRESSIONS

Preliminary impressions are a three-dimensional record of a patient's dentition and anatomy of the alveolar process. Almost all prosthodontic treatment requires preliminary impressions be taken so that a dental cast can be made and used by the dentist as a diagnostic tool and to fabricate various prosthodontic appliances.

MATERIALS REQUIRED

The dentist may direct you, under supervision, to take preliminary impression of the dental arches of a patient. You will need the following materials:

- Alginate
- Impression trays
- Rope-style utility wax
- Mixing bowl, spatula
- Mouth mirror
- Mouthwash
- Water

IMPRESSION PROCEDURES

Once you have all your materials standing by, take a few minutes and explain to the patient what is involved in the impression procedure. The key to taking good impressions is to have the correct size impression tray fit the arches, to mix the alginate, position the tray correctly in the mouth, have the patient relax and breathe through the nose, let the

alginate set, and correctly remove the impression tray. Use the following steps to take preliminary impressions:

1. Select the correct size impression tray and ensure its fit in the patient's mouth is correct. Allow 3-4 mm of space between the tray, teeth, and soft tissues when the tray is positioned in the mouth.

2. Place utility rope wax around the top border of the maxillary and mandibular trays to extend their height. This will also act as a "pad effect" on the soft tissues. Place the trays in the mouth again to ensure the fit.

3. Mix the alginate and water together in the mixing bowl with a spatula. Follow the manufacturer's instructions. Mix into a creamy, smooth consistency. Use the sides of the mixing bowl and press the mixture against it to eliminate air bubbles. Total mixing time is usually 1 minute depending on the type or manufacture of alginate used.

4. Have the patient rinse with mouthwash vigorously. This aids in removing food particles and thick saliva that may cause voids in the impression.

5. As the patient is rinsing, load the **maxillary** tray with the mixed alginate. Load the tray with one large portion of alginate on the spatula using a wiping movement to avoid air being trapped in the material.

6. Wipe off any excess alginate, and smooth the surface of the tray with your index finger. Use the excess alginate from the mixing bowl and place some directly onto the palate with your index finger before seating the impression tray. This prevents a large void within the palatal vault.

7. Have the patient open his/her mouth about halfway. Using your left index finger, retract the patient's right cheek. Carefully place the filled tray into the patient's mouth and use the tray to move the left cheek out of the way.

8. Guide the tray in the mouth and center it over the maxillary teeth. Pressing up with the posterior border of the tray, raise the tray to the hard palate area to form a seal.

9. Keeping the posterior border of the hard palate in place, next raise the tray up over the maxillary teeth. The tray should be seated so that it is parallel with the occlusal plane.

10. Holding the tray in place with your right hand, use your left hand to gently lift the patient's lips and cheeks away from the tray until it is completely seated.

The maxillary arch should now be completely embedded in the alginate material.

11. While keeping the tray parallel with the occlusal plane, pull the upper lip over the anterior border of the tray to form the anterior section of the impression. The average working time from mixing the alginate material to this step is 1 1/2 minutes. After this time, the alginate begins to gel and set up.

12. Still holding the tray in place, look in the patient's mouth and ensure that no alginate material is running down into the throat area. If needed use a mouth mirror to remove any excess. Have the patient relax and tilt the head down and breathe through the nose as the material is setting up. A saliva ejector or patient napkin needs to be in place to catch any excess saliva while the alginate is setting up.

13. After the alginate has set, place one of your index fingers along the lateral border of the tray and press down to break the seal formed by the set alginate material. Once the seal is broken, carefully remove the tray from the patient's mouth and wrap the tray in a moist paper towel. Have the patient rinse his/her mouth out to remove any excess material left from the impression. Have the dental officer inspect the maxillary impression for accuracy.

14. Next, take the mandibular arch impression using the same basic steps as with the maxillary arch technique. When seating the mandibular tray onto the lower arch, have the patient raise the tongue to allow the alginate in the tray to take an accurate impression of the lingual aspects of the alveolar process.

15. Once the tray is seated, gently pull the lower lip over the anterior border of the mandibular tray to form the anterior section of the impression.

16. After the alginate has set, remove the mandibular tray in the same fashion as with the maxillary arch, except push up to break the seal.

17. Have the patient rinse his/her mouth again, and have the dental officer inspect the mandibular impression for accuracy. Wrap in a moist paper towel.

18. The dental assistant will now disinfect the maxillary and mandibular impressions. While in the DTR, remove the moist paper towels. Rinse and disinfect using an accepted phenyl disinfectant on the impression material and trays. Wrap in moist paper towels again and place impressions in a headrest cover for transportation to the dental laboratory.

FABRICATING CAST

The laboratory technicians will usually pour most of the impressions, but there will be times when you must perform this task. To fabricate a quality cast, you must first start with a quality impression.

PREPARING TO POUR IMPRESSIONS

Once you have an accurate impression, producing an accurate cast is simple if the impression and materials are prepared correctly. A minor mistake in any of these areas could cause a distorted cast.

IMPRESSION

Pour the impressions as soon as possible because all impression materials are subject to distortion. Cleanse impressions to remove mucous and saliva. This helps to ensure accurate surface detail and

eliminates the chance of soft spots in the cast. To cleanse the impression, rinse it under cool tap water, or lightly sprinkle stone into the impression and thoroughly rinse the stone away. If there is heavy mucous and blood in the impression, you might need to brush it lightly with a large soft sable paint brush. Remove excess moisture by gently shaking the impression. Never dry an impression or use an air blast to remove moisture because you might distort or tear the impression material. Figure 8-29 illustrates common problems with alginate impressions.

MATERIALS AND MIXING

To produce a good cast from the impression, you need to use a properly mixed gypsum product. Most often you will use hydrocal (dental stone). To assure a good cast mix, perform the following steps.

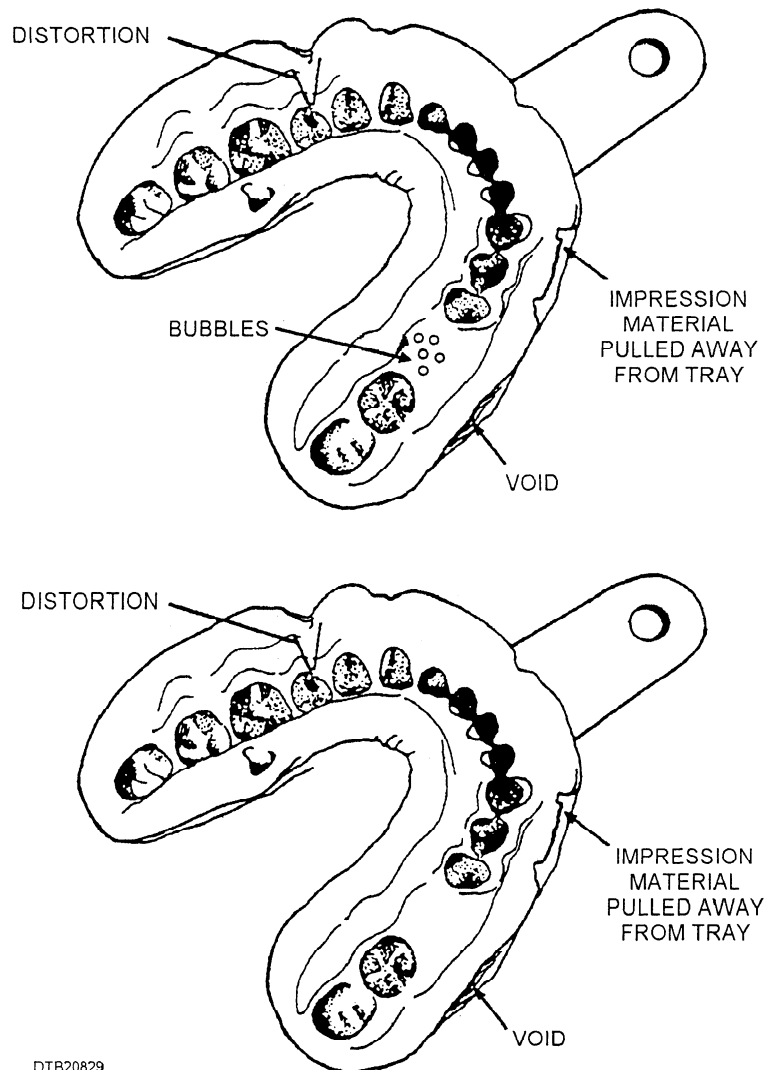


Figure 8-29.—Common problems with alginate impressions.

1. Always use a clean mixing bowl and spatula. The best time to clean a bowl and spatula is immediately after pouring the impression while the material is still soft and easy to remove.

2. Measure the volume of water and weigh the powder before you mix any gypsum material. An accurate water-to-powder ratio is a must to preserve the properties of any gypsum product.

3. Always add the powder to the water, never the water to the powder.

4. Spatulate thoroughly by hand, incorporating all the powder evenly throughout the mix until creamy. Avoid whipping the mix; doing so will cause the final product to have excessive air bubbles.

5. Vacuum mix using a power mixer-investor whenever possible. Vacuum mixing helps to eliminate incorporation of air into the mix. If you can't vacuum mix, tap the mixing bowl against the bench top or hold it on the vibrator for a few moments to express any air that might be trapped in the mix.

6. Never add water to a mix that is too thick; this interferes with the setting properties. It would be better to discard the mix and start over again.

POURING IMPRESSIONS

The primary objective when you pour a cast is to capture all the surface detail of the impression, and as bubble-free as possible. This is done using a vibrator to make a thick gypsum mix, which flows into all the crevices of the impression. There are several ways to pour impressions, such as the upright, two-step, and boxed methods. We will only discuss the two-step method of pouring a cast, because it is the most successful method of pouring preliminary and final impressions.

First Pour

Begin by holding the impression tray so that the handle rests against the vibrator. Start at one end of the arch and flow a small amount of stone into the impression, letting it slowly advance to the other side as shown in figure 8-30. Flow the stone slowly enough to watch the progress of the stone as you fill each tooth imprint. This should eliminate bubbles. If a bubble appears and does not go away with vibration, pop it with a small instrument. Use an acrylic mixing spatula to place small amounts of stone into minute preparations or teeth with wide incisal and narrow

cervixes. Touch the impression to the vibrator to flow each addition of stone.

After covering all the critical surfaces of the impression, you may safely add progressively larger amounts of the mix. There is a rate of vibration that is best for each mix's ability to flow. The vibration intensity should be set high enough to make the material move across the surface of the impression. The vibrator is set too high if the impression "jumps" in your hand, moves so fast that it skips over surface detail, or if vibration wave patterns develop on the surface of the mix. Continue filling the impression stone to a level slightly above the height of the impression walls (about 2 mm thick). Do not flow stone over the outside of the tray because it must be removed before the impression can be separated from the cast.

Lastly, add retention nodules to this first pour as shown in figure 8-31(A). Stone retention nodules are used between the first and second pours so the two stone layers can be locked together mechanically. Place the handle of the tray in a holding device; do not lay the impression on the counter or the cast will be distorted. Now let this first pour set for about 45 minutes, or at least until the stone loses its glazed appearance before making the cast base.

Second Pour

It is now time for you to make the cast base. Use the cast trimmer to grind down the long retention nodules (if completely set), reduce the base of the cast's thickness, and make the top of the tray parallel to the cast's bottom. In general, the length of the retention nodules should equal the height of the tray flanges.

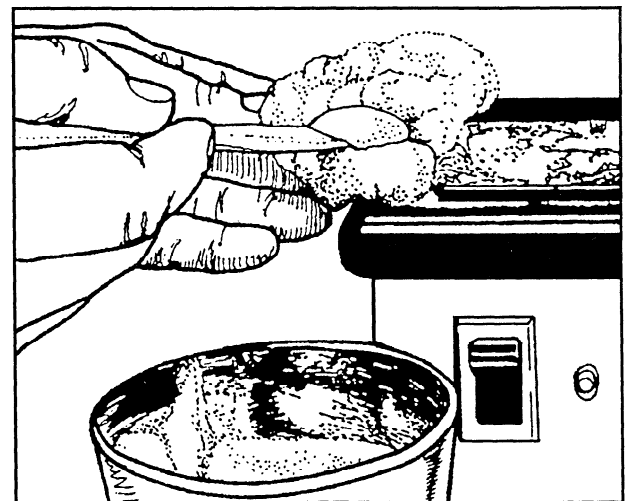
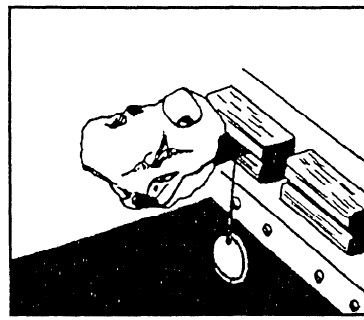
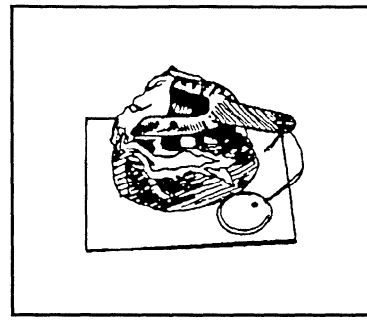


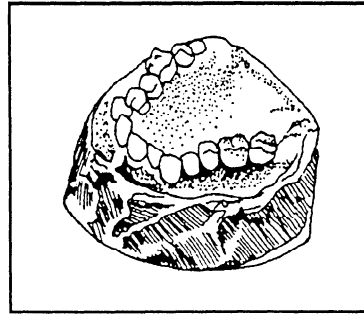
Figure 8-30.—Pouring the first pour of an impression.



(A) FIRST POUR WITH RETENTION NODULES



(B) HARDENED FIRST POUR FLIPPED ONTO A STONE PATTY



(C) CAST SEPARATED FROM THE IMPRESSION

Figure 8-31.—Two-step method of cast fabrication.

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With a second mix of stone, form a patty for the base. Add stone around the retention nodules and invert the first pour into the patty. Now use your spatula to shape the sides of the cast base as shown in figure 8-31(B). Take care not to bring stone up onto the tray embedding the tray into the base. **With a mandibular cast, you must take time to smooth and contour the tongue space while the second mix is still soft.**

TRIMMING CAST

Casts should present as neat and attractive as possible. After the heat generated by the final setting reaction dissipates completely (about 45 minutes), trim any stone from the outside of the tray with a plaster knife and separate the cast from the impression as shown in figure 8-31(C). Do not hurry and force the tray or you may break off some teeth, especially if the tray is embedded in the base. If a cast is not separated from an alginate impression before the alginate shows signs of dehydration, the cast will probably show unacceptable surface damage.

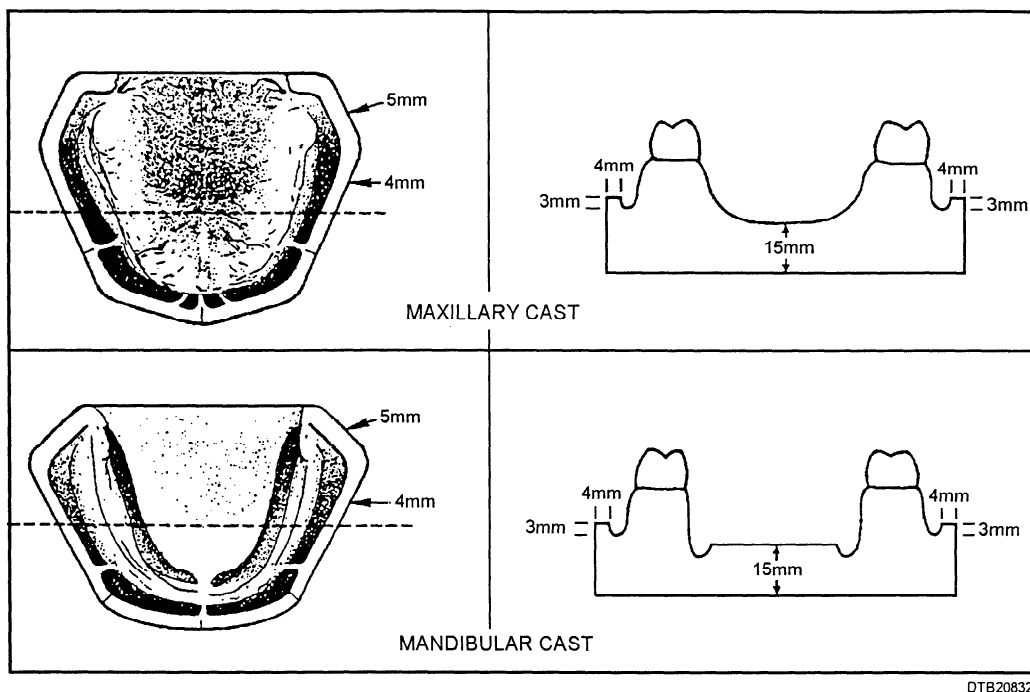
PRELIMINARY STEPS

Before trimming the cast, you must soak it in a saturated dihydrate solution (SDS). Never trim a dry cast because the slushy debris coming off the trimming wheels will fall on the dry surface and become

permanently attached to the cast surface. Mark the cast with trimming lines. These lines will help you determine the base thickness; align the base plane to the occlusal plane of the teeth; and trim the outer boundary alongside the posterior teeth, the anterior teeth, and the posterior border of the cast.

TRIMMING

Figure 8-32 shows the desired cast dimensions of a trimmed cast. Start trimming the cast by grinding the cast bottom parallel to the occlusal plane of the teeth. The cast should be about 15 mm (5/8 inch) thick at its thinnest place (usually the palatal vault of the upper and the tongue space region of the lower). Make sure the cast includes all the denture support areas and all of the features that define denture borders. Keep the cast free of nodules or voids. When trimming a maxillary cast, make it as much like the general shape shown in figure 8-32. Trim a mandibular cast to correspond with the shape shown in the same figure. Fully represent the sulci area in the cast, but not more than 3 mm deep. The sulci are routinely protected by a peripheral "land" area or ledge extending 4 mm outward. Make sure the cast extends 5 mm beyond the hamular notch area of the maxillary arch and 5 mm beyond the retromolar pads of the mandibular notch.



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Figure 8-32.—Trimmed maxillary and mandibular cast.

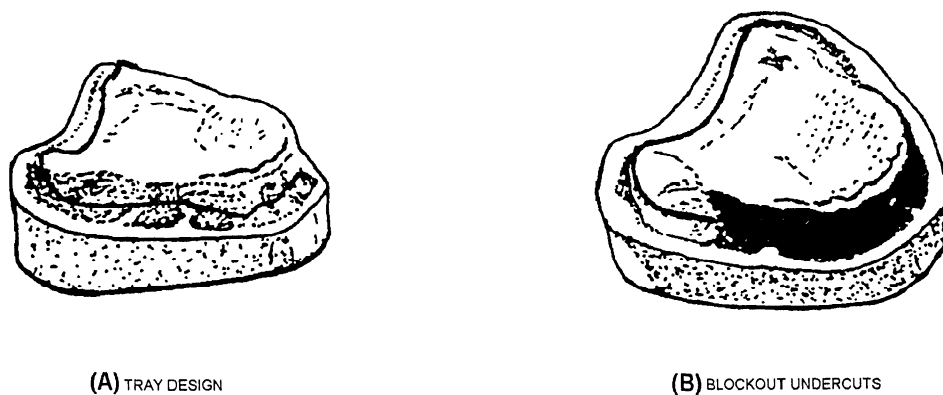
FABRICATING CUSTOM IMPRESSION TRAYS

Prefabricated trays are made to fit everyone moderately well, but will not fit anyone very well. On the other hand, a custom tray provides a dentist with an impression material carrier that permits the dentist to make a more accurate impression that they could make using a stock (prefabricated) tray. The custom tray is made on a diagnostic cast. The dentist draws the border outlines of the proposed custom tray on the diagnostic cast, as shown in figure 8-33(A), and gives other directions, such as handle position and the need for vertical stops. You may then make the tray so it conforms to the design. Two of the most popular ways of making custom trays are self-curing resin dough

method and the vacuum method. We will limit this discussion to the more frequently used dough method.

SPACERS

The dentist will usually prefer a custom tray that provides room for a controlled thickness of impression material. Spacers used to develop vertical tissue stops accomplish this purpose. The stops are made to hold the tray off the cast by a distance equal to the thickness of the spacer. When the spacer is removed and the tray is placed in the patient's mouth, the stops hold the inner surface of the tray out of contact with the patient's tissue. The subsequent space between the tray and tissue is then later filled with impression material.



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Figure 8-33.—Design and blockout for a custom tray.

FABRICATING TRAYS WITHOUT SPACERS

Custom trays for complete denture patients are often made without spacers and adapted directly to the ridge. If a spacer is not used for tray construction, the undercuts on the cast must be eliminated very carefully using baseplate wax. Failing to do so will result in a damaged cast or tray when you attempt to remove the hardened tray.

Preparing the Cast

First, paint the cast with two layers of tinfoil substitute to prevent the acrylic resin from sticking. Next, use baseplate wax to generously block out (fill in) all undercuts within the tray area outlined on the cast as shown in figure 8-33(B).

Mixing the Resin

Using premeasured amounts of monomer and polymer, add the powder to the liquid and mix the materials. Allow the mix to set until it reaches the doughy stage.

Adapting the Resin

Use a simple stone mold to control the shape and thickness of the resin dough. This preshaped resin mass results in a tray of consistent quality when adapted to the cast.

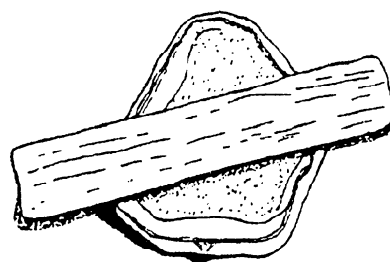
Lightly coat your fingers with petrolatum before placing the dough in the stone mold. Be sure the mold is also coated with petrolatum. Cover the dough with a moistened polyethylene sheet. Quickly roll out the resin to match the mold's shape and thickness as shown in figure 8-34(A). Trim away the excess dough and lift the acrylic resin blank from the mold.

Center the resin over the cast and rapidly adapt the dough by hand to the cast's surfaces. Be careful not to create thin spots by pressing too hard. Shape the resin to the borders and cut away the excess with a sharp knife as shown in figure 8-34(B).

Next, attach the handle to the tray, ensure the handle is strong enough to withstand considerable force, and that its shape will not interfere with lip movement. Mix another small amount of tray resin. When polymerization reaches the dough stage, form it into an L shape. Use a few drops of monomer to moisten the attachment site between the handle and the tray. Press the handle onto the moistened area. The fluid monomer should provide good bonding. If you work fast enough, you should be able to use the unpolymerized excess from the first mix for the handle as shown in figure 8-34(C).

Finishing the Tray

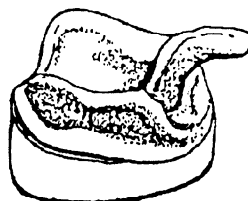
After the acrylic has set, remove the tray from the cast and remove any wax adhering to the inside of the tray. Trim the tray's flanges back to the peripheral



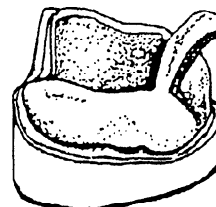
(A) ROLL OUT RESIN DOUGH



(B) APPLY RESIN WAFER;
CUT AWAY EXCESS



(C) FORM A HANDLE



(D) FINISHED TRAY

DTB20834

Figure 8-34.—Fabricating custom trays using the dough method.

border markings as drawn by the dentist and shown in figure 8-34(D). Use the bench lathe with an arbor band to remove bulk. The posterior border of the maxillary custom tray is supposed to extend a short distance onto the soft palate. Mandibular custom trays cover the retromolar pads. Use acrylic finishing stones and burs for finer details. Be sure there are no sharp edges on the tray's borders.

FABRICATING A TRAY WITH SPACERS

The preceding paragraphs described trays that were closely adapted to the diagnostic cast. In contrast, custom trays for **fixed restorative** patients are always made over wax spacers. The design for this type of tray appears in figure 8-35(A). With the exception of the tray's design and the use of a wax spacer, the procedures for fabricating a fixed custom tray are the same as we mentioned before. Let's briefly look at the differences.

Applying a Wax Spacer

After the dentist traces the outline on the diagnostic cast, you can fill the undercuts, and adapt two layers of baseplate wax to the tray area on the cast. Adapt each layer of wax, one layer at a time. Cut out four small pieces of the baseplate wax over the crest of the ridge areas outlined in the molar and cuspid regions

for tissue stops as shown in figure 8-35(B). Remove the spacers from the cast and apply a tinfoil substitute to the gypsum surfaces of the cast to prevent the acrylic resin from sticking. Place the spacer back on the cast and apply a **thin** layer of petrolatum to the surface of the baseplate wax. This will make removal of the wax from the polymerized tray easier.

Fabricating the Tray

Use the self-curing dough method to make the tray. After the resin is hard, remove the tray from the cast and pull the baseplate wax off the tissue surface of the tray. (Four tissue stops should appear on the ridge areas where the four pieces of baseplate wax were originally cut out.) Trim any excess acrylic resin to the outline border on the cast. Round and smooth the borders of the tray. Your finished trays should appear like those in 8-35(C). **Be certain to clean away all traces of petrolatum that might be present on the tissue surface of the tray.** (Sandblasting does this very effectively.) Clean and disinfect the tray, place it on the cast for storage.

FABRICATING MOUTHGUARDS AND VACUUM-FORMED TEMPLATES

In addition to pouring and trimming study casts, and fabricating custom trays, you may be called upon

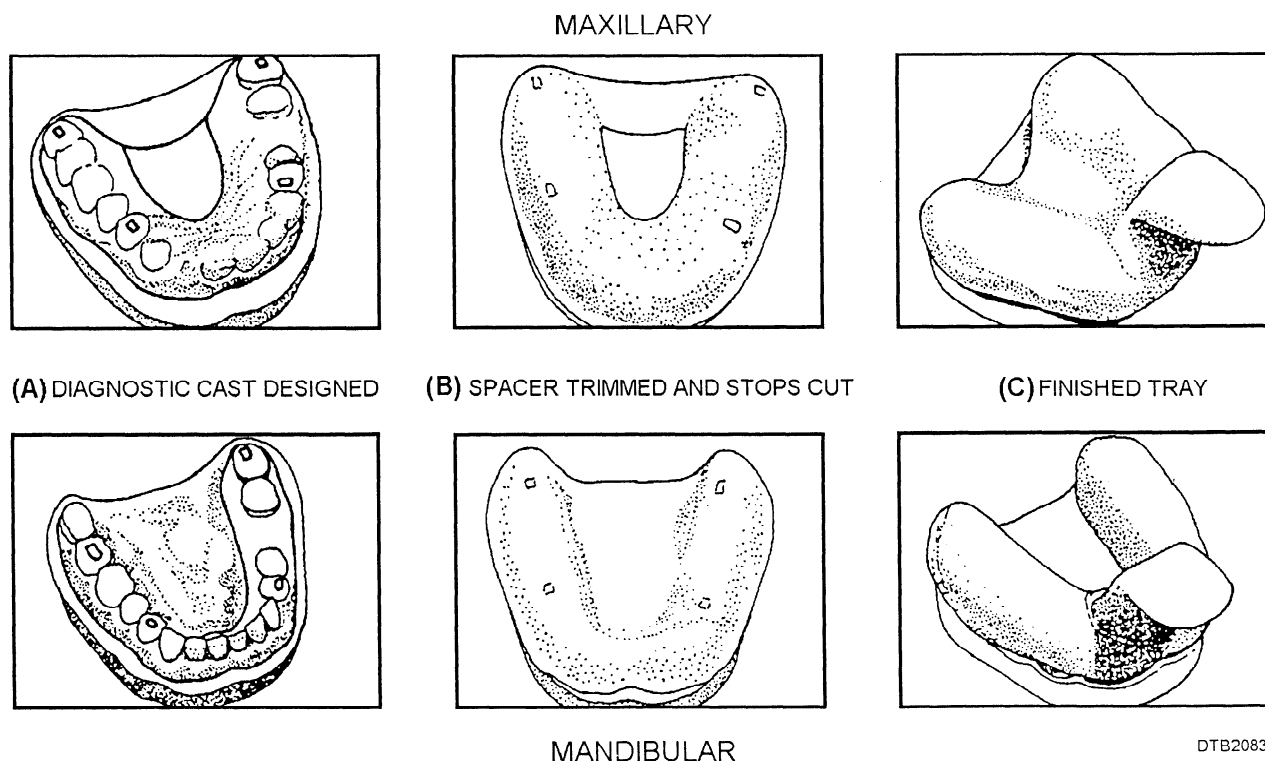


Figure 8-35.—Fabricating custom trays over wax spacers.

DTB20835

to fabricate mouthguards and vacuum-formed templates. Many of the steps involved in fabricating these devices are similar and fairly simple to learn.

FABRICATING MOUTHGUARDS

Mouthguards are constructed of acrylic resin or vinyl-like material that covers and protects all of the teeth in the arch. The purpose of a mouthguard is to reduce the potential for injury to the teeth and surrounding tissues. Although a mouthguard does not prevent the teeth from fracturing, it does keep the fragments from lacerating or embedding in the oral tissue. The mouthguard also reduces the risk of concussion by acting as a shock absorber. If the head is impacted, the guard cancels part of the force, reducing the risk of concussion.

Preparing the Cast

The first step in fabricating a mouthguard is to draw the outline of the mouthguard on the cast with a soft lead pencil. Design the mouthguard by drawing or scribing a line around the maxillary arch in the buccal flange area to the highest point to which you want the material to extend. Normally, the mouthguard extends to the point where the soft tissue meets the attached gingiva. Next, trim the working cast as close to the outline as possible as seen in figure 8-36(A). The thickness of the cast base should not exceed 6 mm. The reason for trimming the cast as specified is to facilitate the vacuum formation and to minimize stretching and thinning of the vinyl plastic during the molding. For the same reason, drill a hole in the palate with a large pear-shaped bur. Soak the cast in water for a couple of seconds to prevent the hot thermoplastic material from adhering to the cast. Remove excess water from the cast. Place the wet cast on the perforated plate of a vacuum-forming device.

Vacuum-Forming the Mouthguard

Several different types of vacuum-forming machines can be used to adapt thermoplastic material. Most machines consist of a perforated plate connected to a source vacuum, an electrical heating element, and a metal frame in which the vinyl plastic blank can be clamped. Regardless of the machine's manufacturer, the procedures used to adapt the material are basically the same. The construction procedures, in general, consist of the following steps:

1. Clamp a vinyl plastic blank in the frame, and place it in position to be heated. The molding temperature usually is estimated by the amount the sheet of vinyl plastic material "sags" as it softens (fig. 8-36(B)). Excessive heating of the material will cause the mouth protector to stretch and thin out. Sharp reproductions of the surface detail are not necessary.

2. When the material is ready, turn the vacuum on and move the frame to the molding position (fig. 8-36(C)). Hold it in this position until the vinyl plastic is completely adapted to the contours of the cast.

3. Turn off the vacuum. Release the clamp on the frame and set the cast with the mouth protector aside until it cools completely.

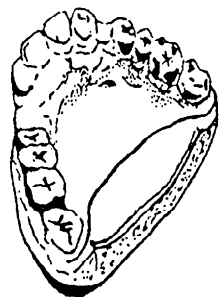
Completing the Mouthguard

Trim excess material away with scissors as shown in figure 8-36(D). Heat a Bard-Parker blade and trim the outline of the mouthguard. Remove the mouthguard and reduce the borders to approximately 5-7mm. A large bur, arbor band, or finishing stone may be used to reduce the border thickness. Polish the edges with pumice, or lightly flame the mouthguard with an alcohol torch. Flaming has the benefit of clearing any cloudy areas in the material. Wash and disinfect the mouthguard, then place it in a prosthetic denture bag for delivery to the patient.

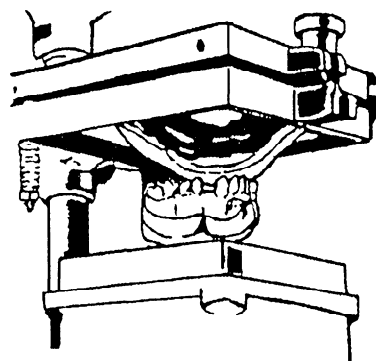
The completed mouthguard should conform to the general outline presented in figure 8-36(E). Notice that the posterior border of the maxillary mouthguard ends on the hard palate, and that the facial flanges do not restrict the movement of any frenula. The posterior border may end in the rugae area to increase the patient's speech and comfort.

FABRICATING VACUUM-FORMED TEMPLATES

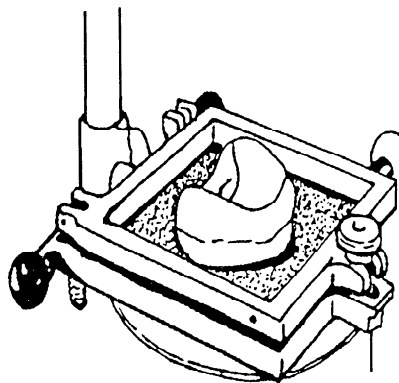
Provisional fixed restorations (temporaries) are usually made using some type of matrix or template. Two methods more commonly used for providing these templates are the impression method and the vacuum-forming method. Basically, the template or impression is a shell that will be filled later with tooth colored resin and seated on the prepared teeth, forming the provisional restoration. For this purpose, we will only discuss making a template using the vacuum-forming method since you are already familiar with how to make an impression.



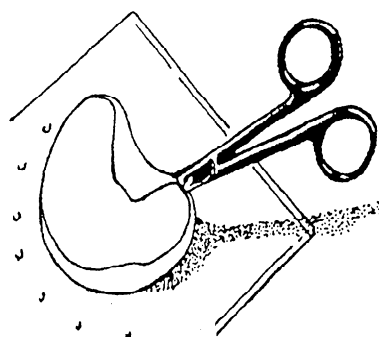
(A) CUT BACK THE CAST, OUTLINE THE MOUTH PROTECTOR'S BORDERS



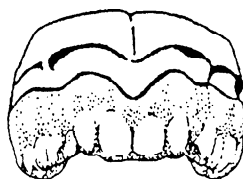
(B) HEAT MOUTH PROTECTOR MATERIAL IN AN ADAPTING UNIT



(C) SUCK THE MATERIAL DOWN ONTO THE CAST'S SURFACES



(D) TRIM THE EXCESS



(E) FINISHED PROTECTOR

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Figure 8-36.—Fabricating mouthguards.

Vacuum-formed templates are made using clear splint material (.020-inch), a vacuum-forming machine, and a cast. If the teeth that the dentist intends to prepare have large cavities, fill in the defects with dental cement and carve the cement to the proper shape. If the temporary prosthesis is for a proposed FPD site, also adapt spare resin denture teeth to the edentulous space as shown in figure 8-37. Sticky wax them in place and if needed, adjust the occlusion.

Place the cast on the vacuum-forming machine and mount the plastic sheet below the heating element.

Heat the material until it sags about 1 1/2 to 2 inches, and vacuum-form the clear splint material over the cast. At first, the material appears cloudy and then will become clearer. You know the material is overheated when you begin seeing small bubbles appear.

Splint material is not pliable like mouthguard material, making it difficult to remove from the gross soft tissue undercuts that may be present on the cast. Use a heated Bard-Parker knife to cut away the excess material in the sulcus areas and around the base of the cast. You should now be able to pry the arch form

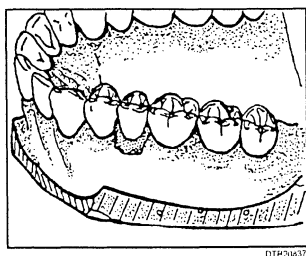


Figure 8-37.—adapting a denture tooth to the edentulous space.

template off the cast for final trimming with scissors. Cut out the section needed for the provisional restoration **plus** one or two uninvolved teeth anterior and posterior to it as shown in figure 8-38. When you are finished, clean and disinfect the template; and place it and any of the unused arch sections back on the cast so they won't distort. Often, subsequent restorations are made for the same patient, and the unused arch sections are kept in case they will be needed at a later date.

SIMPLE ACRYLIC REPAIRS

Occasionally, you will be required to perform minor repairs on complete and removable partial dentures. These repairs may include fractured dentures, or replacing fractured, missing or loose teeth. These repairs may be caused by changes in the oral tissues, careless handling, etc. The dentist will decide if any impression of the patient's mouth is needed for the repair, and will tell you what needs to be done to complete the repair. Since every repair is a little different, these next procedures describe some, but not all, of the possible repair solutions. If you need assistance, refer your questions to the dentist or prosthetic technician.

DENTURE BASE REPAIRS

Figure 8-39 shows a **simple** denture base fracture. The repair procedures will include aligning the fractured parts, pouring a plaster cast (matrix),

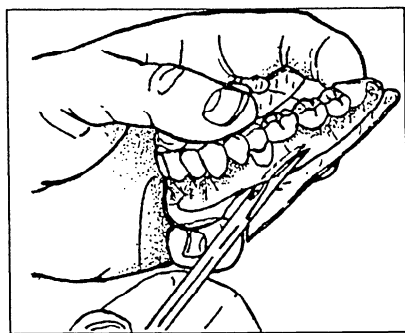


Figure 8-38.—Trimming away excess material with scissors.

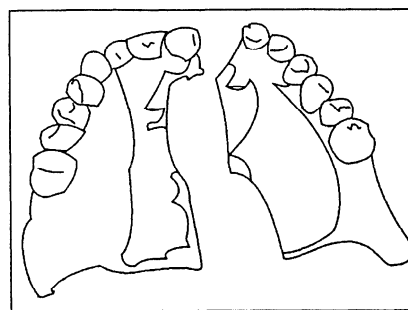
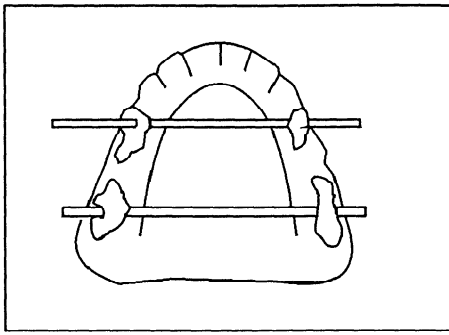


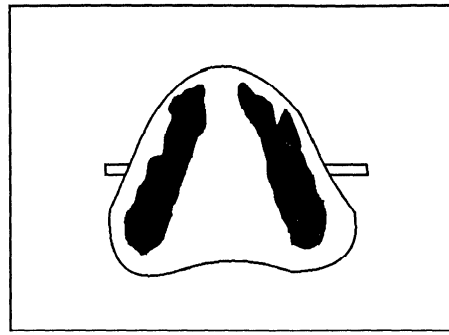
Figure 8-39.—Simple denture base fracture.

widening the fracture line and making retentive grooves, applying self-curing acrylic resin, adjusting, and polishing. When the pieces of the denture base cannot fit against one another in a precise relationship, or one or more fragments have been lost, this type of a fracture is classified as **complex**. Since complex fractures should be repaired by prosthetic technicians, they will not be covered in this chapter. To repair a simple denture base fracture, perform the following steps (A-H) shown in figure 8-40:

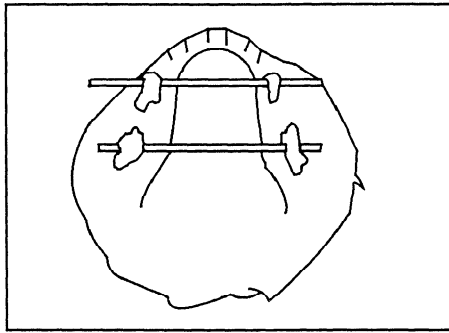
1. Align the fractured denture parts and apply sticky wax over the fracture line on the external surfaces of the denture.
2. Stabilize the parts by positioning denture burs with sticky wax as shown in step A.
3. Block out all undercuts on the internal surface that will be exposed to the plaster with a wet pumice mix or block out wax (step B). Do not block out undercuts along the fracture line. Blocking out the undercuts enable you to remove the plaster cast after it sets.
4. Prepare a plaster mix.
5. Slowly pour the plaster into the internal surface of the denture. The plaster cast should cover the fracture line, but not the entire denture. This procedure is accomplished by holding the denture in you hand and gently resting it against the vibrator.
6. Place the denture in an upright position (step C) and allow the plaster to cure.
7. Once the plaster is set, gently remove it from the cast.
8. Remove the denture burs and all traces of the sticky wax and pumice.
9. With a new denture bur, widen the fracture lines (step D) on the denture and place retentive grooves along the fracture line.
10. Paint two thin, even coats of tinfoil substitute on the cast (step E).



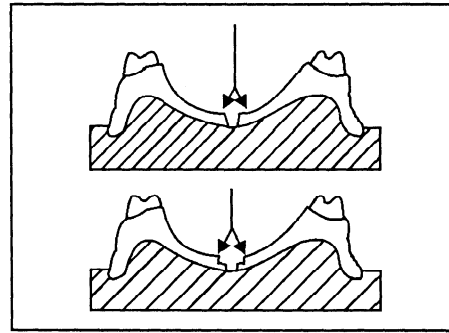
A. ALIGN AND STABILIZE THE FRAGMENTS.



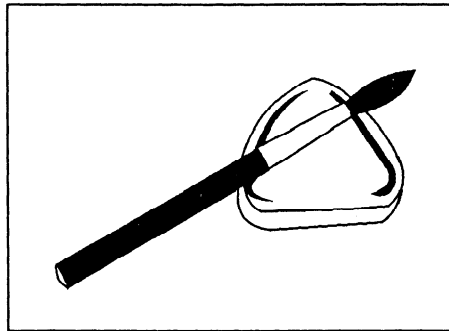
B. BLOCK OUT TISSUE SURFACE UNDERCUTS.



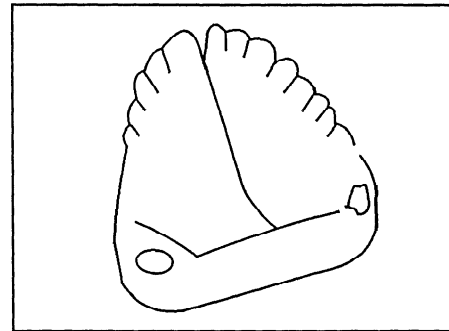
C. DENTURE UPRIGHT POSITION



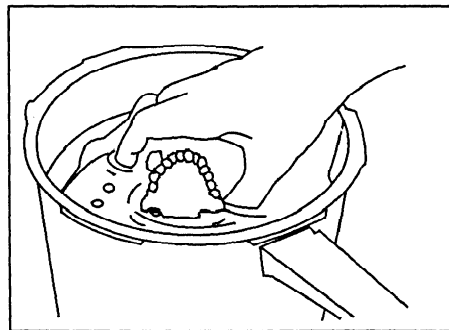
D. CROSS SECTION OF DENTURE, SHOWING WIDENED FRACTURE LINE.



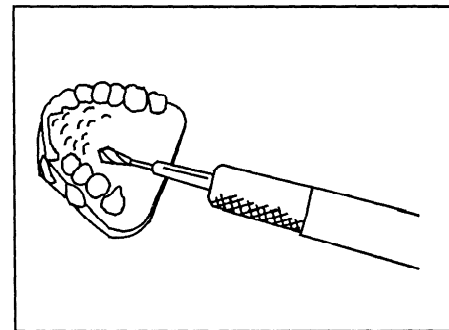
E. PAINT THE CAST WITH TIN FOIL SUBSTITUTE.



F. STICKY-WAX THE DENTURE FRAGMENTS TO THE CAST.



G. PLACE IN A PRESSURE POT.



H. TRIM EXCESS.

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Figure 8-40.—Denture base fracture repair steps.

11. Align the denture parts on the cast and hold them in place with sticky wax at the posterior edges (step F).

12. Prepare the self-curing acrylic resin.

13. Moisten the brush with monomer and dip it into the polymer (powder), and apply it to the fractured area. Repeat this procedure until the fracture is covered and slightly overfilled.

14. Allow the denture to stand for a few minutes until the sheen of the resin disappears from the surface.

15. Place the denture and the cast in a pneumatic curing unit (step G).

16. Cover the denture with lukewarm water (115°F) and secure the lid.

17. Attach the rubber tubing to the air valve on the lid and till with compressed air to 20 psi.

18. The curing process will take 30 minutes.

Note: If a pneumatic curing unit is not available, place denture and cast in a bowl of lukewarm water for 30 minutes or until the resin hardens. This is not the recommended procedure but may be used in emergencies.

19. Gradually turn the air release valve on the lid to relieve the inside pressure. When the pressure gauge reads zero, carefully remove the lid.

20. Remove the repaired denture base from the pressure pot.

21. Using a denture bur, trim all excess acrylic from the denture (step H).

22. Polish the external surfaces with pumice and a muslin or brush wheel that is mounted on a bench lathe. If a lathe is not available, you may use a mandrel-mounted wheel on a straight handpiece.

23. Disinfect and place denture in a prosthetic bag with water for delivery.

DENTURE TOOTH REPAIRS

The original tooth can be reattached if it is still intact, but some repairs will require a new denture tooth. The following procedures describe simple denture tooth repairs that do not involve the facial denture base plastic (complex fracture). The example given is of an anterior tooth that fell out. If the facial denture base plastic needs repair, a prosthetic technician or a dental officer will perform the repair. To accomplish a denture tooth repair, perform the following steps (A-F) as shown in figure 8-41:

1. Roughen the lingual aspect of the acrylic teeth to guarantee good chemical bonding with the repair material. Use an inverted bur to undercut a hollow opening in the lingual aspect of the acrylic tooth.

2. Make a box preparation (step A) in the denture base, lingual to the tooth to be repaired.

3. Position the tooth (step B) in its seat and sticky wax it in place from the lingual.

4. Construct a plaster cast facial matrix to hold the tooth in position during repair. It should include the tooth that is being repaired and the tooth on each side (step C).

3. After the plaster has set, remove the matrix and clean all wax from the box preparation (step D).

6. Paint the matrix with a tinfoil substitute (step E).

7. Reassemble the denture, the tooth, and the matrix in correct alignment. Sticky wax the tooth to the matrix, and the matrix to the denture (step F).

8. Place self-curing resin to the repair area in the same manner as described in the denture base repair section. Build up the repair resin slightly higher than the surrounding denture base.

9. Place the tooth repair in a pneumatic curing unit and follow the same steps as described in the denture base repair section for curing, finishing, and polishing.

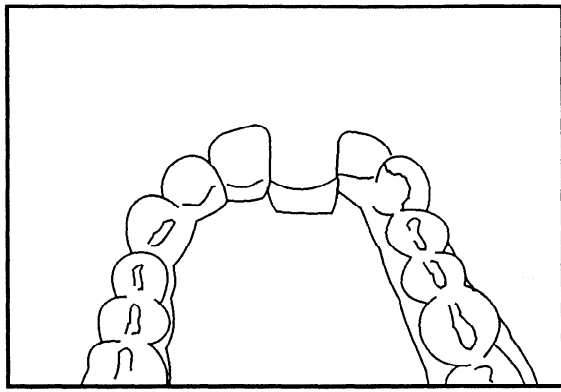
10. Disinfect and place the repaired denture in a prosthetic bag with water.

PROSTHODONTIC CHAIRSIDE ASSISTING

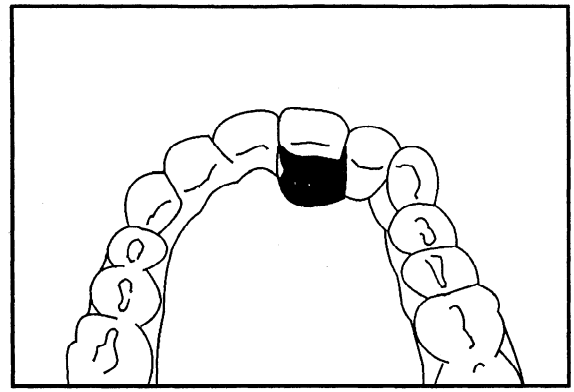
The basic clinical procedures are essentially the same as in all direct patient care in dentistry. The prosthodontic procedures, sequence of treatment, and materials required vary with the specific treatment requirements for the patient and the individual dentist. This section covers the basic chairside duties a prosthodontic assistant performs with a dentist. In-depth techniques and procedures should be learned from on-the-job training.

Most prosthodontic cases require a series of appointments. It is your duty as the assistant to schedule these appointments. Two basic factors influence the scheduling of prosthodontic patients:

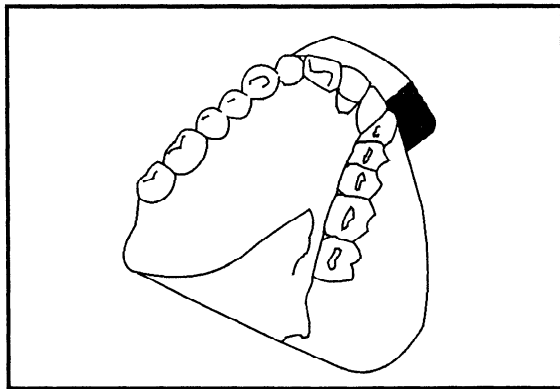
- The procedures to be done during the appointment



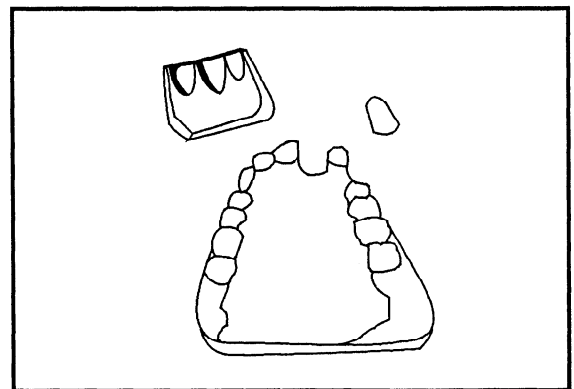
A. MAKE A "BOX" PREPARATION



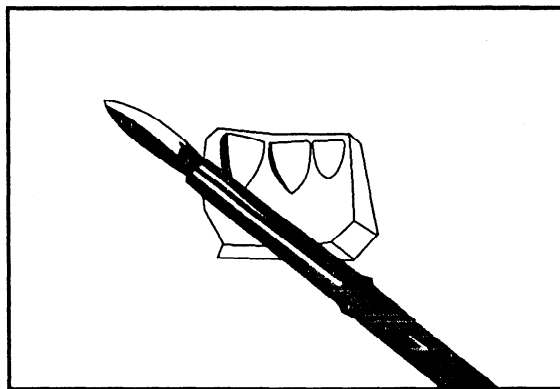
B. POSITION THE REPLACEMENT TOOTH



C. CONSTRUCT A FACIAL MATRIX

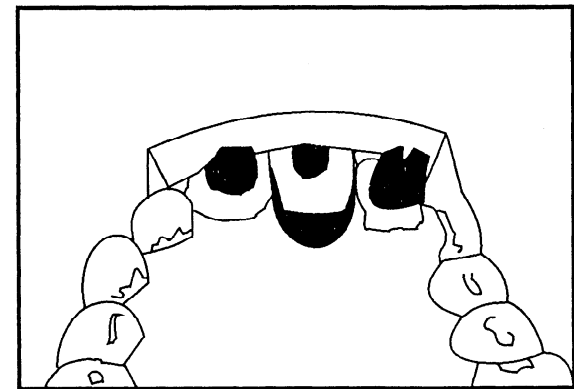


D. CLEAN ALL WAX FROM THE BOX PREPARATION



E. PAINT THE MATRIX WITH TINFOIL SUBSTITUTE

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F. REASSEMBLE THE TOOTH, DENTURE, AND MATRIX

Figure 8-41.—Anterior denture tooth repair steps.

- The laboratory time required between appointments

These factors will, of course, dictate the time allocation and date for which you should reschedule the patient. Each new prosthodontic patient requires

an evaluation that may include complete oral radiographs. The dentist uses the radiographs to diagnose cysts, residual roots, unerupted and impacted teeth, periodontal conditions, caries, bone density, or other conditions requiring restorative or surgical correction before prosthodontic treatment is started.

At the evaluation appointment, preliminary impressions are made and diagnostic casts are then poured from the preliminary impressions

USE AND COMPLETION OF DD FORM 2322

Whenever dental laboratory work is required to support prosthodontic treatment, a DD Form 2322, Dental Laboratory Work Authorization (figs. 8-42), must be completed. This triplicate form has several purposes. It contains patient information and fabrication instructions, and is used as a precious metals voucher and an entry from for composite laboratory value (CLV) codes.

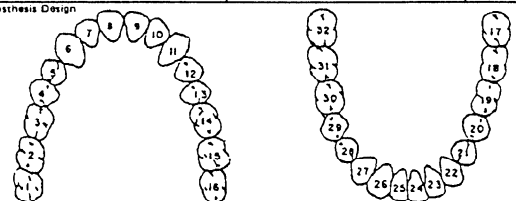
The responsibility for initiating the patient data for this form is usually delegated to the dental assistant. In doing so, you must take care to fill out the form completely and accurately. The dentist will fill in blocks 15-28. It advises the laboratory, in writing, exactly what materials to use and the services to be provided. An incomplete or inaccurate form may result in the lack of necessary items required to fabricate the prosthesis.

FIXED PROSTHETIC PROCEDURES

Most steps in tooth preparation for crowns and FPDs are similar. The number of appointments to complete the fixed prosthesis will vary depending on what is being fabricated. A single metal crown can be delivered in 2 to 3 appointments; whereas, a porcelain fused to metal crown or bridge usually requires 3 to 4 appointments. A basic prosthodontic tray setup is illustrated in figure 8-43. You should become thoroughly familiar with each instrument and understand its use. The basic steps involved at this appointment involve selecting a shade (if porcelain is used), preparing the tooth or teeth, making the final impression, and preparing and cementing the temporary restoration.

Shade Selection

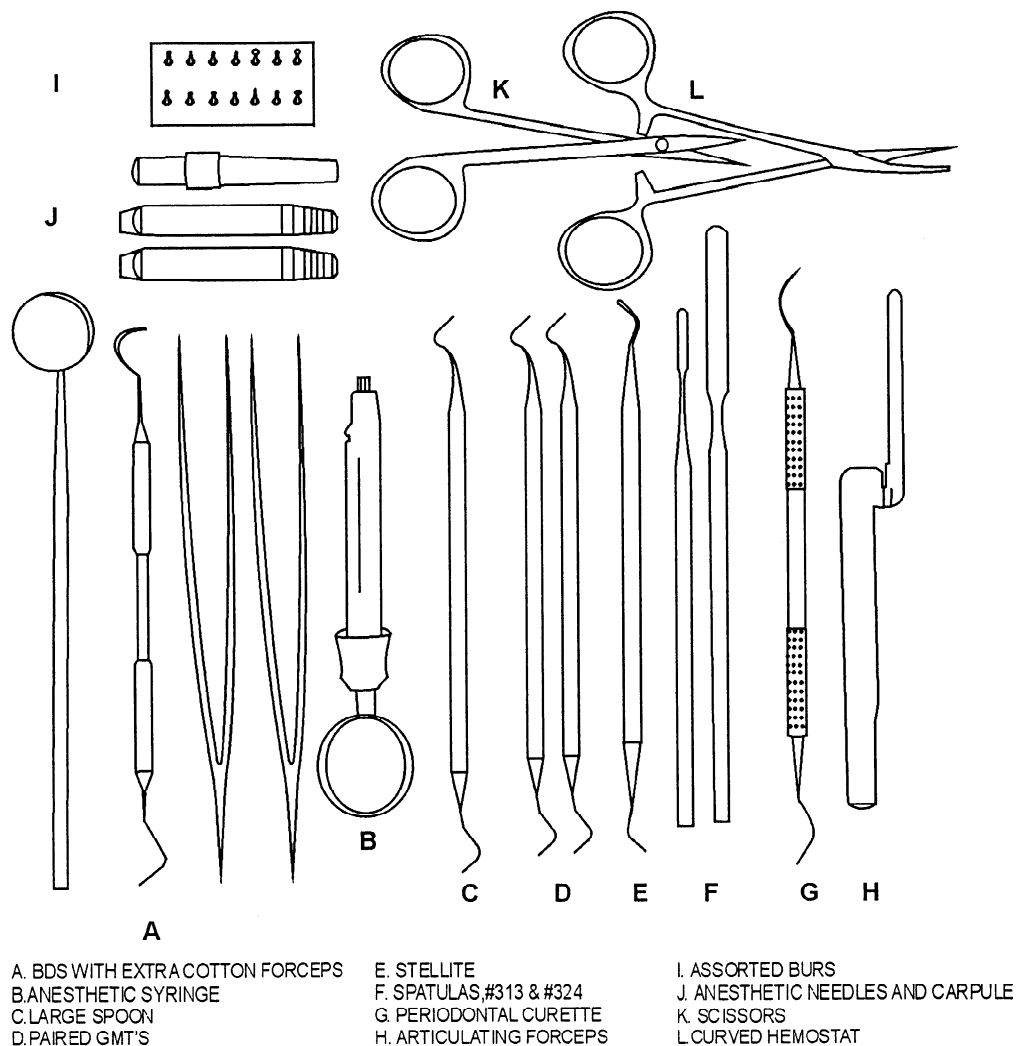
Before any tooth preparation, it is best if the dentist selects a tooth shade. Each manufacturer provides a number of different colors in its porcelain system and a shade guide for use in the selection of the tooth color. One the shade is selected, ensure that you or the

1. Local Case No.		2. Name of Treatment Facility, Mailing Address & Autovon No.			3. ADL Case No.		
4. Patient's Name (Last, First, Middle Initial)		5. SSN		6. Grade	7. Age	8. Date Initiated	
9. Beneficiary Type		10. Organization, Duty and Home Telephone Nos.				11. Date Forwarded	
12. Type of Prosthesis or Restoration		13. Shape and Mold by Guide				14. Date Delivered	
15. Prosthesis Design 							
Request(s) (Check appropriate box(es))				16. <input type="checkbox"/> Framework Only		17. <input type="checkbox"/> Set-Up	
18. <input type="checkbox"/> Process		19. <input type="checkbox"/> Fully Fabricate		20. <input type="checkbox"/> Bisque Bake		21. <input type="checkbox"/> Consultation	
Inclosed Items 22. <input type="checkbox"/> Diagnostic Casts 23. <input type="checkbox"/> Jaw Relation Record 24. <input type="checkbox"/> Radiographs 25. <input type="checkbox"/> Other (See remarks) 26. Clinician's Remarks/Instructions							
27. Typed Name and Grade of Dental Officer				28. Signature			
DD FORM 2322 83 OCT		S/N 0102-LF-002-3220		DENTAL LABORATORY WORK AUTHORIZATION			

LABORATORY DATA								
1. Name of Dental Laboratory								
2. Date Received	3. Date Completed	4. Teeth, Facings or Pontics						
		Location	Tooth Nos.	Shade	Guide	Mold		
		Max Ant						
		Max Post						
		Men Ant						
		Men Post						
5. Articulator		6. Metals Voucher No:						
Number and Settings		Metals Used		Out		In		
		Type	DWT	GR	DWT	GR	DWT	GR
7. Laboratory Remarks, Instructions, or Consultation Report								
8. Typed Name and Grade of Laboratory Officer						9. Signature		

Figure 8-42.—Dental Laboratory Work Authorization, DD Form 2322 (Front and back).

DTB20842



DTB20843

Figure 8-43.—Basic instrument tray setup for prosthodontic treatment.

dentist record the information in block #13 of DD Form 2322.

Preparation

The primary purpose of the initial tooth or teeth preparation appointment is to remove tooth structure, and provide adequate space for the crown or bridge being made. The initial preparation of the tooth is accomplished with a tapered diamond bur in an ultra-speed handpiece. The dentist must reduce the tooth for the crown or bridge so that it is thick enough to provide for an adequate amount of strength, without increasing the size of the tooth. The basic procedures of tooth or teeth preparation you will assist in are:

- If the tooth or teeth have not been endodontically treated, the dentist will administer dental anesthesia.

- Isolate the working area by using cotton rolls and retract the cheek, lips or tongue, and evacuate debris during the removal of tooth structure.

- Assist in placing gingival retraction cord when the dentist creates the margin of the preparation so as not to damage the supporting structures of the free gingival margin. The dentist may have you take a piece of retraction cord and place it in a hemostatic agent that assist with control of hemorrhage.

- The cord is placed into the gingival crevice with a flat-bladed instrument (fig. 8-44) and then the end of the cord is cut and the preparation finalized.

Final Impression

After the dentist is satisfied with the preparation, you will prepare the materials for the final impression. A custom tray has usually been fabricated for this appointment. Preparation for the tray impression

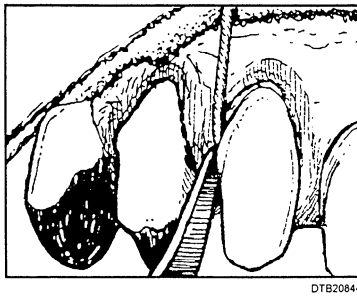


Figure 8-44.—Placing gingival retraction cord into gingival crevice.

actually begins during tooth preparation at the stage when the gingival area is isolated with retraction cord. A properly positioned cord serves two functions:

- It displaces the free gingiva for completing the tooth preparation.
- It opens the gingival sulcus for the impression.

Before you prepare the impression materials, you must paint the custom tray with a tray adhesive that is compatible with the impression material. Be sure to accomplish this well in advance to allow the adhesive to set.

At this stage, one end of the cord should protrude from the sulcus so it can be easily grasped with cotton forceps for removal before injecting the impression material into the gingival sulcus. Additional preparation of the mouth for the impression includes, irrigation, aspiration, and isolation of the preparation site with clean dry cotton rolls.

The impression materials that the dentist will select for use may be light-cured, or supplied as a two-paste base and catalyst system that is mixed in equal length. Some manufacturers market the two-paste impression materials in a manner that eliminates the need to manually mix the material. These materials are mixed using a gun-like dispenser, which is loaded with twin tubes of catalyst and base. Whatever material the dentist chooses, always refer to the manufacturer's instructions to mix the material.

Usually, impression material of two different viscosities (bodies) are used. You will prepare **regular-bodied** material and load it into the custom tray, and also prepare a **light-bodied** material and load it into a syringe (if not using the gun-like dispenser method). As the retraction cord is removed, the dentist injects the light-bodied material around the sulcus of each individual tooth preparation. During this procedure, you assist with retraction of the lip, cheeks and/or tongue, and have the impression filled custom

tray ready for insertion. Once the dentist seats the tray, you will place a saliva ejector in the patient's mouth to remove excess saliva while the impression material sets. Once set, the dentist removes the impression and inspects it for quality. Allow you patient to rinse with water, and provide a hand mirror and tissue to allow them to clean excess material from the face. Before you take the impression to the laboratory, be sure to disinfect it according to current infection control standards.

Bite Registration

The dentist may determine that an accurate bite registration is necessary to establish the proper occlusal relationship during mounting. A bite registration can be made in many ways. Some of the common methods use reinforced bite registration wax, or dental stone mixed with slurry water (water from model trimmer).

Interim (Temporary) Crown or FPD

The last step in this appointment is that a temporary crown or FPD must be made to cover and protect the prepared tooth or teeth while the permanent prosthesis is being fabricated. To protect tooth sensitivity, the temporary should extend to the margin of the tooth preparation but not beyond it. A temporary that extends beyond the margin into the gingival tissues will become an irritant to the tissue. A properly constructed temporary will have the following characteristics:

- Smooth and polished so it does not irritate the tongue, lips, cheeks, or gingival tissues.
- Provides the appropriate occlusal form and relationship to any opposed teeth.
- Provides appropriate proximal contact relationships with unprepared adjacent teeth to prevent drifting.
- Provides acceptable esthetics if placed in an anterior area.

Temporary crowns or FPD's can be constructed from preformed acrylic resin and aluminum shells. Plastic stints and alginate impressions can also be used with self-curing acrylic resin to make an interim prosthesis.

When the temporary is finished, a temporary cement such as zinc oxide and eugenol is used to deliver the interim restoration onto the prepared tooth or teeth. Consult the manufacturer's instructions for

proper mixing of the material. After the temporary cement has set, use the mirror and explorer to gently remove all excess cement from the crown and gingival area. Check the patient's occlusion again and allow you patient to rinse his/her mouth with water to remove any debris or loosened excess cement.

At the end of this appointment, make arrangements for future visits before dismissal of the patient. Be sure to annotate the DD Form 2322 with the date, time, and step of the next treatment planned. This information is essential to the dental laboratory for fabrication of the requested work.

INSERTION OF FIXED PROSTHETICS

The basic steps involved in inserting crowns and fixed FPDs are the same. Your instrument tray setup for insertion is the same as shown in figure 8-43. You will need to include assorted stones and burs for adjustment of the prosthesis. Usually, local anesthesia is not required since most patients can tolerate the minimal discomfort associated with the insertion of the prosthesis. The basic steps in delivery of the final prostesis include removal of the temporary, try-in and adjustment, stain and glaze, and permanent cementation.

Removal of the Temporary

The removal of the temporary is usually delegated to the dental assistant. Do this gently since your patient usually does not have anesthesia and may experience some slight sensitivity. Use the following steps when removing a temporary:

1. Use an instrument, such as a stellite, to loosen the temporary bond at the margin of the temporary.
2. Once removed, clean any debris or retained temporary cement on the tooth or teeth with a cotton pellet and cotton forceps.

Try-In

One of the first steps in the try-in of the prosthesis is the adjustment of the proximal contacts. Proximal contacts between adjacent teeth should exist, but be nonwedging. The proper amount of contact exists when there is a slight snap of dental floss as the dentist passes it through the contact areas. The dentist will check other aspects of the prosthesis as follows:

- Ensures the prosthesis is fully seated.

- Evaluates the pontic adaptation visually, and then passes dental floss between the pontic tip and the tissue ridge to ensure very little, if any, pressure is on the residual ridge mucosa.

- Uses articulating paper to mark any areas of interference between the prosthesis and the opposing teeth, and then reduces them with dental stones and burs in a dental handpiece.

If the prosthesis is completely metal, any surface roughness resulting in clinical adjustments is eliminated, and the metal is highly polished before cementation.

Stain and Glaze

If the prosthesis involves porcelain, the dentist will stain and glaze the porcelain to characterize the porcelain for maximum esthetics. Unstained and unglazed porcelain is referred to as being in a *bisque bake* state. Before the prosthesis can be cemented, it must be returned to the laboratory to fire the stain and glazed porcelain. After glazing, the laboratory will highly polish the exposed metal of the prosthesis. The prosthesis is now ready for cementation.

Cementing the Prosthesis

The final step in this appointment is the cementing of the prosthesis. The treatment site must be kept clean and dry throughout the procedure.

Zinc phosphate (ZnPO_4) and glass ionomer cement have been recognized as excellent permanent cementing agents for fixed prosthetics. ZnPO_4 , however, is highly acidic during the initial setting stage because of the presence of phosphoric acid. Therefore, ZnPO_4 can be quite irritating to the pulp tissues if the cementation process is not handled properly. Some dentist prefer to coat the preparation with copalite varnish before cementation with ZnPO_4 . Other permanent cements such as reinforced Zinc oxide and Eugenol (ZOE), ethoxybenzoic acid (EBA), and polycarboxylate (PCA) cements are less irritating to the pulp tissues, but have not proved to be clinically superior to glass ionomer as a permanent cement. You must follow the manufacturer's instructions for dispensing and mixing the particular cement selected.

To accomplish cementation of FPD, perform the following steps A through C shown in figure 8-45:

1. Isolate the treatment site with clean, dry cotton rolls, and gently dry the prepared tooth or teeth with a gentle blast of warm air or cotton pellet (step A).

2. Prepare the cement according to the manufacturer's instructions.

3. Carefully place mixed cement into each retainer or crown in a manner that eliminates the possibility of trapped air.

4. The dentist seats the prosthesis over the prepared tooth or teeth and applies firm finger pressure with a cotton roll to the occlusal or incisal surface to express the excess cement (step B).

5. For posterior areas, the patient is instructed to bite firmly into balsa wood, orange wood stick, or a cotton roll that is placed over the prosthesis for the final seating.

6. While the cement is still fluid, the dentist uses a sharp explorer tip to examine the marginal fit and verify the seating of the completed restoration.

7. Place a saliva ejector in the patient's mouth to ensure the area remains dry while the cement sets.

8. Do not attempt to remove excess cement until it has set to the point of being "brittle-hard".

9. When hard, use an instrument such as a periodontal curette, to remove all cement from around the restoration, tooth, and the gingival sulcus area (step C).

10. Gently floss the area, irrigate, and evacuate the area to ensure it is clean.

Before dismissing patients with fixed prosthetics, instruct them in procedures for cleaning the restorations.

REMOVABLE PARTIAL DENTURES

Some of the basic procedures for RPDs are the same as FPDs, but require much more laboratory and appointment sittings. The following is a typical treatment plan you may be involved with if assisting with the fabrication of an RPD. Each bullet represents a scheduled appointment.

- Prosthetic examination and alginate impressions for study casts.
- Mouth preparations for RPD framework and final impressions.
- Framework try-in and adjustment.
- Final impression of edentulous ridges for fabrication of the acrylic denture base, occlusal registration, and denture tooth selection.

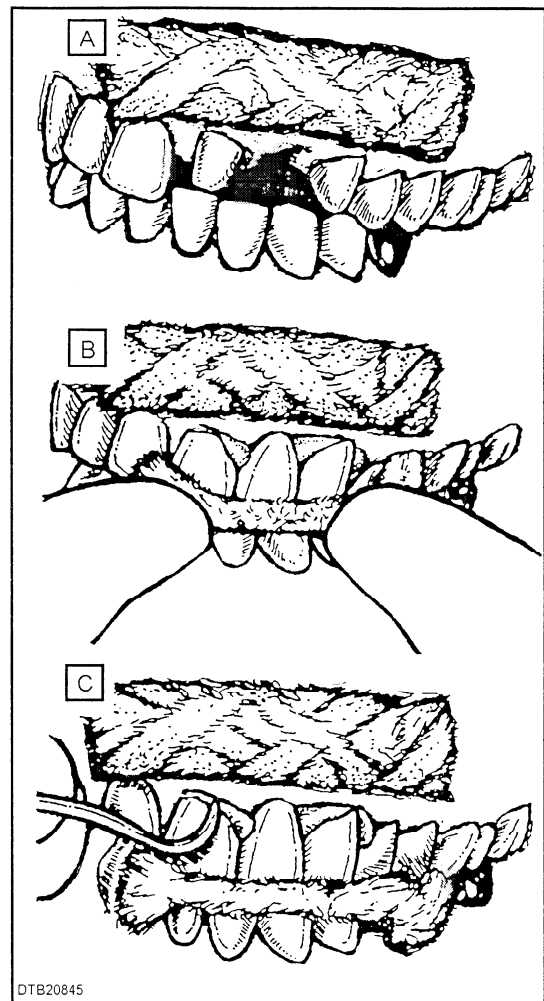


Figure 8-45.—Steps in cementing a permanent FPD.

- Deliver RPD and make initial adjustments as necessary.
- Follow-up adjustment RPD appointments as required.

COMPLETE DENTURES

As with FPDs and RPDs, many of the basic procedures are the same. With increased public awareness on proper oral hygiene, personnel who require complete dentures are becoming a very small population of the armed services. The procedures that you will assist in are interocclusal registration, tooth and tooth shade selection, tooth arrangement, impressions, and CD delivery.

STANDARD OPERATING PROCEDURES PROSTHETICS LABORATORY

As a chairside prosthetic assistant, you must become familiar with the procedures of the prosthetic

laboratory. If you do not know these procedures, patient cases can be lost or routed improperly. If you have any questions about different procedures, ask the dentist or prosthetic technician.

CASE REQUESTS

Cases entering the laboratory are required to be accompanied with a work authorization request (DD Form 2322). Requests are to be filled out with instructions, signed by the requesting doctor, and must indicate desired completion date. The case is then entered into the Prosthetic Log and assigned a case number. This entry must be made by the person delivering the case to the laboratory.

IMPRESSIONS

Before entering the laboratory ALL impressions are to be sprayed with an approved disinfectant in accordance with BUMEDINST. 6610.10, chapter 6, and covered with a plastic wrap (head rest covers work great). The laboratory technician is to be informed of the arrival of the impressions.

Alginate Impressions

Alginate impressions are to be placed into the tray holder at the plaster bench to prevent distortion of the impression (a moist paper towel should be placed over the impression to prevent dehydration of the material).

Final Impressions

This includes complete dentures, removable partial dentures, crowns, and bridges. These impressions are poured as prescribed by the doctor; if no instructions are provided, they will be poured with stone mixed with liquid stone hardener.

Study Casts

Study casts are fabricated for diagnostic purposes and poured as prescribed by the doctor. If no instructions are provided, they will be poured in plaster.

STONE OR PLASTER CASTS

Trim the casts once they are separated from the tray. Casts are trimmed to remove excess material by use of the model trimmer.

- You are required to don protective ear and eyewear.

- Turn on water supply to desired flow.
- Activate the model trimmer.

Trimmed casts will be rinsed, dried, and marked with the patient's last name and case number (if space is available). The case will then be routed according to the work authorization request.

CASES WHILE IN THE LABORATORY

Casts will be kept in case pans, protected in plastic (when available). Case pans will be labeled with patient's name, doctor, date started, and prosthesis being fabricated.

Pumice and polishing procedures for the fabrication of new prostheses will not require special precautions. Repairs, relines, rebases, or adjustments of any prosthesis that has had contact with patient's body fluids are considered old cases and will require precautions. Lathe instructions for pumice and polishing are as follows:

- The technician is required to ensure correct placement of the protective shield is in the down position before activating the lathe.
- Pumice is to be replaced after each use.
- Wheels/brushes used for pumice and polishing are to be removed from machine and sent to CSR.
- Prostheses should be put into a glass beaker or ziplock bag containing cleaning solution, then placed into ultrasonic.

Ultrasonic Cleaner

The prosthetic ultrasonic cleaning machine is the same as the CSRs except that dental prostheses are run through. The following are guidelines for its use:

- Ultrasonic to contain water approximately 1 to 1-1/2 inches. Special solutions to be used in ziplock bags or glass beakers.
- General-purpose cleaner or stone and plaster remover solutions can be reused when used on new cases. Once solution is used for an old case, the solution is to be discarded.
- Stain and tarter solution is used for old cases and will be used one time then discarded.

Once the ultrasonic cleaning procedure is completed, the prosthesis is then brushed and rinsed with water. It is then bagged and replaced into the assigned case pan.

Completed Cases

The work authorization request will be closed out in the Prosthetic Log by entering the date of completion. This is done by the delivering dentist or the technician. The work authorization request will be retained in the laboratory for two years. The case pan and its contents will be placed on the plaster bench for cleaning. Cleaning includes the emptying of used models and the spraying down of the case pan.

GUIDELINES FOR INFECTION CONTROL IN THE DENTAL LABORATORY

When you are working in the prosthetic department or the laboratory, infection control is still a major concern. Follow BUMEDINST 6600.10, *Dental Infection Control Program*, for complete guidance and instructions. Prostheses or impressions may carry a multitude of bacteria in dental plaque, blood, or saliva. To protect everyone from cross contamination and possible infection, dental personnel must use proper techniques for disinfection of material before sending it to the laboratory from the DTR and vice versa.

BARRIER CONTROL

Place barriers wherever possible to prevent cross contamination. Establish a designated area in the dental laboratory where technicians disinfect all incoming and outgoing items.

DTR INFECTION CONTROL

Wipe contaminated shade guides, face-bows, articulators, and alcohol torches with an

EPA-registered disinfectant. Also disinfect pliers and other special instruments after each use, even if they do not come in contact with blood or saliva. An alternate method is immersing the instruments in an EPA-registered intermediate or high-level disinfectant such as iodophor or 2 percent glutaraldehyde.

Instrument Sets

When possible, use trays to allow sterilization or disinfection of multiple instruments.

Unit Dose Concept

Use of the unit dose concept prevents contamination of bulk supplies. Dispense enough to complete the entire procedure when using such items as petroleum jelly, impression materials, waxes, pressure disclosing or indicator paste, disposable brushes, and orthodontic brackets and wires.

Processing and Transfer to the Laboratory

When possible, rinse and disinfect impressions, prostheses, and intraoral devices before transfer to the laboratory to reduce chances of cross contamination. If the integrity of the item or material is compromised by this disinfection, a waiver should be requested through the command on the item (for example, porcelain-stained crown before bake). Place casts and prostheses in self-sealing plastic bags to prevent contact with adjacent materials, the shipping box, foam insulation, or paper work. Consider everything returned from a dental laboratory as contaminated. The receiving facility must disinfect these items.

